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Training Manual (TRAMAN)

Standard First Aid Training Course

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Although the words "he," "him," and "his" are used sparingly in this manual to enhance communication, they are not intended to be gender driven nor to affront or discriminate against anyone reading this text.

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PREFACE

This First Aid Manual and Nonresident Career Course (NRCC) are designed to serve as basic first aid instructional materials for all nonmedical naval personnel. The course may be used for individual study as well as for group instruction.

The assignment booklet for the NRCC contains learning objectives, multiple-choice questions, and situational problems to guide the student systematically through the manual. Critical information and basic principles of treatment are reinforced throughout the course.

This course was revised by the Naval Health Sciences Education and Training Command, under the supervision of the Bureau of Medicine and Surgery, for the Chief of Naval Education and Training.

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THE UNITED STATES NAVY

GUARDIAN OF OUR COUNTRY

The United States Navy is responsible for maintaining control of the sea and is a ready force on watch at home and overseas, capable of strong action to preserve the peace or of instant offensive action to win in war.

It is upon the maintenance of this control that our country's glorious future depends; the United States Navy exists to make it so.

WE SERVE WITH HONOR

Tradition, valor, and victory are the Navy's heritage from the past. To these may be added dedication, discipline, and vigilance as the watchwords of the present and the future.

At home or on distant stations we serve with pride, confident in the respect of our country, our shipmates, and our families.

Our responsibilities sober us; our adversities strengthen us.

Service to God and Country is our special privilege. We serve with honor.

THE FUTURE OF THE NAVY

The Navy will always employ new weapons, new techniques, and greater power to protect and defend the United States on the sea, under the sea, and in the air.

Now and in the future, control of the sea gives the United States her greatest advantage for the maintenance of peace and for victory in war.

Mobility, surprise, dispersal, and offensive power are the keynotes of the new Navy. The roots of the Navy lie in a strong belief in the future, in continued dedication to our tasks, and in reflection on our heritage from the past.

Never have our opportunities and our responsibilities been greater.

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CHAPTER 1

INTRODUCTION TO FIRST AID

First aid is the emergency care given to sick or injured persons. Emergency care must not take the place of proper medical or surgical treatment, but should consist only of furnishing temporary assistance until competent medical aid is available.

The purposes of first aid are (1) to save life, (2) to prevent further injury, and (3) to prevent or minimize infection.

Everyone in the Navy must know when and how to apply first aid measures and must be prepared to give competent assistance to persons injured in battle, collision, fires, and other accidents that may occur on land, sea, or in the air. A real knowledge of first aid and its purposes, when properly applied, can mean the difference between life and death, between rapid recovery and long hospitalization, and between temporary disability and permanent injury.

In administering first aid, you have three primary objectives. They are (1) to maintain an open airway, (2) to maintain breathing, and (3) to maintain circulation. Additionally, you must stop any bleeding, and prevent or reduce shock.

You must work quickly, but do not rush around frantically. Do not waste time looking for ready-made materials, but do the best you can with whatever is at hand. Also, send for medical help as soon as possible.

GENERAL FIRST AID RULES

Although each case of injury or sickness presents its own special problems, there are some general rules that apply to practically all situations. Before proceeding to learn the specific first aid treatment for various types of injuries, you should have a thorough understanding of the following rules:

1. Keep the victim lying down, with his head level with his body, until you have found out what kind of injury the person has and how serious it is. However, it should be quickly noted if the victim has one of the following problems that represents exceptions to this rule and requires different positions.

a. Vomiting or bleeding about the mouth—If the victim is in danger of sucking in blood, vomited matter, or water, place him on his side, or on his back with his head turned to one side, and lower than his feet. Special care must be taken for a victim with a spinal injury, which is discussed later.

b. Shortness of breath—If the victim has a chest injury or breathing difficulties, place him in a sitting or semi-sitting position.

c. Shock—If the victim is in shock, place him on his back with his head slightly lower than his feet. If the injuries permit, the victim's feet should be raised and supported 6 to 12 inches off the deck.

2. In examining the victim, move him no more than is absolutely necessary. It may be necessary to remove some of his clothing to determine the extent of his injuries. Remove enough clothing to get a clear idea of the extent of the injury. If done incorrectly, removing clothing may do great harm, especially in fracture injuries. If necessary, rip or cut clothing along the seams. When clothing is removed, ensure that the victim does not become chilled. Shoes may have to be cut off to avoid causing pain or increasing an injury.

3. Keep the victim reassured and as comfortable as possible. Often, a restoration of confidence is very helpful. Assure the victim that his injuries are understood and that he will get medical attention as soon as possible.

4. Do not touch open wounds or burns with your fingers or other objects except when sterile compresses or bandages are not available and it is absolutely necessary to stop severe bleeding.

5. Do not try to give an unconscious person any solid food or liquid substance by mouth. The victim may vomit and get some of the material into his lungs when he breathes, causing choking. Death could result.

6. If a bone is broken, or if you suspect that one is broken, do not move the victim until you have immobilized the injured part. This may prove lifesaving in cases of severe bone fractures, or spinal cord injuries, for the jagged bone may sever nerves and blood vessels, damage tissues, and increase shock. Of course, threat of fire, necessity to abandon ship, and other similar situations may require that the victim be moved. But the principle should always be kept firmly in mind and considered against other factors.

7. When transporting an injured person, always make sure the litter is carried feet forward no matter what injuries the victim has sustained. This will enable the rear bearer to observe the victim for any respiratory obstruction or stoppage of breathing.

8. Keep the injured person comfortably warm—warm enough to maintain normal body temperature.

Very serious and mutilating injuries may require heroic first aid measures on your part; but the greater number of injuries will require a minimum of effort on your part and a maximum of judgement and self-control to prevent you and well intentioned bystanders from trying to do too much.

CHAPTER 2

BASIC LIFE SUPPORT

Oxygen, present in the atmosphere at a concentration of 21%, is essential for the life of all tissues and cells. Within seconds of being deprived of oxygen, the heart is at risk of developing irregular beats or stopping; within minutes, the brain is subject to irreversible damage.

The delivery of oxygen from the atmosphere to the cells and tissues of the body requires two necessary actions: breathing and circulation. Any disruption of these two actions can quickly lead to damage or even death.

Basic life support is a phrase you have probably heard before. It consists of the emergency techniques for recognizing and treating failures of the respiratory (breathing) system and cardiac (heart) function. The primary emphasis is placed on maintaining an open **AIRWAY** to counter upper airway obstruction, restoring **BREATHING** to counter respiratory arrest (absence of breathing), and restoring **CIRCULATION** to counter cardiac arrest (heart stoppage). These are the ABC's of basic life support. This chapter will attempt to cover some of the essentials of basic life support. It is important for you to know that this course is not a substitute for a formal course in basic life support. Formal courses, such as those given by the American Heart Association or the American Red Cross, provide hands-on training using manikins. This training is essential for proper execution of the emergency techniques necessary to provide basic life support.

UPPER AIRWAY OBSTRUCTION

Clutching at the throat is done automatically by most people who are choking and is recognized as the universal distress signal for upper airway obstruction (see figure 2-1). The most common cause of upper airway obstruction in a conscious person is improperly chewed food that lodges in the throat; in an unconscious person, when the tongue falls against the back of the throat.

Figure 2-1.—Universal distress signal.

PARTIAL OBSTRUCTION

If the victim is able to cough or speak, this indicates that there is an adequate air exchange. Encourage the victim to continue with his own efforts to expel the foreign body. Do not interfere with the victim's efforts to remove the obstruction. Observe the victim closely for increased distress, and be prepared to provide assistance for a completely blocked airway. First aid for a partial obstruction with good air exchange is limited to encouragement and observation.

Inadequate air exchange, which is indicated by a weak or ineffective cough, high-pitched noises while the victim attempts to inhale, and a bluish discoloration of the skin (especially around the finger nails and lips), requires your immediate

assistance. Handle the problem as if it were a complete airway obstruction.

COMPLETE AIRWAY OBSTRUCTION

Complete airway obstruction is indicated by no air exchange and an inability to speak, cough, or breathe. If the victim is conscious, he may exhibit the universal distress signal, as identified above.

If the victim is unconscious, check for breathing. If the victim is not breathing, the tongue or some other object may be blocking the air passage. In either case, first aid consists of opening the airway, techniques that are described below.

OPENING THE AIRWAY

Immediate opening of the airway is the most important consideration in basic life support. Without an open airway, spontaneous breathing will not occur and artificial ventilation cannot succeed.

Head Tilt-Chin Lift

The head tilt-chin lift is the most effective method for opening the airway. The lower jaw is supported by lifting the chin. The finger tips of one hand are placed under the lower jaw on the bony part near the chin, bringing the chin forward, supporting the jaw, and helping tilt the head back. Avoid putting too much pressure under the chin, as this may cause obstruction of the airway. Press on the victim's forehead with your free hand to tilt the head back, (figure 2-2), opening the airway.

Figure 2-2.—Head tilt-chin lift.

If spontaneous breathing does not occur, open the victim's mouth and look for foreign objects such as food particles, loose dentures, or other objects that may obstruct the airway. If present, remove them by inserting your finger into the victim's mouth and gently sweeping from the inside of one cheek to the other. Be careful not to force the material into the victim's throat. Reposition the victim's head, ensuring an open airway, and check for breathing by listening for breath sounds, feeling for exhalation, and looking for a rise and fall of the chest. If the airway is still obstructed or if objects are lodged in the throat, it may be necessary to remove them by using the abdominal thrust or chest thrust described later.

Jaw Thrust

Another technique for opening the airway is the jaw thrust. This technique is to be used if a neck injury is suspected. Kneeling at the top of the victim's head, place your fingers behind the angle of the jaw or hook your fingers under the jaw, then bring the jaw forward (figure 2-3). Note that the head is not tilted and the neck is not extended. Separate the lips with your thumbs to allow breathing through the mouth as well as through the nose.

Abdominal Thrust

The abdominal thrust or Heimlich maneuver is the preferred initial treatment to dislodge a foreign body obstruction. This procedure is effective because the residual air in the lungs is compressed forcing air into and through the throat, dislodging any object.

ABDOMINAL THRUST STANDING TECHNIQUE. Stand behind the victim, and wrap your

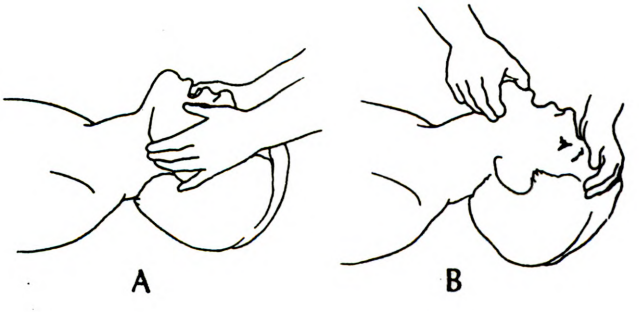


Figure 2-3.—Jaw thrust.

arms around the victim's waist, as illustrated in figure 2-4. Make a fist with one hand, and place it with the thumbside against the abdomen, slightly above the navel. Grasp the fist with your other hand (figure 2-5). Press the fist into the victim's abdomen with a quick upward thrust. Repeat the thrust 6 to 10 times or until the obstruction is dislodged. Each new thrust should be a separate and distinct movement. The obstruction should pop out like a champagne cork.

ABDOMINAL THRUST RECLINING TECHNIQUE. This technique is performed with the victim lying flat, face up. Position yourself for the thrust by straddling the victim at the hips or kneeling beside the victim's thighs. Place the heel of one hand on top of the other, slightly above the navel but below the breast bone, with your fingers pointing toward the victim's head (figure 2-6). Press into the abdomen with 6–10 quick upward thrusts. Following the abdominal thrusts, turn the victim's head to one side and check for loose foreign matter with a sweeping motion of your index finger inside the mouth.

Chest Thrust

For obese or pregnant victims, the chest thrust method is recommended in place of the abdominal thrust; manual pressure to the abdominal area of these people would either cause damage or be ineffective.

Figure 2-4.—Abdominal thrust.

Figure 2-5.—Abdominal thrust.

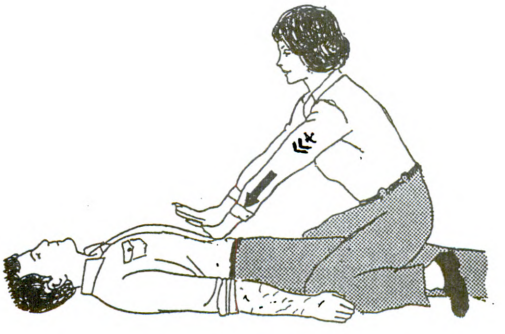


Figure 2-6.—Abdominal thrust reclining.

CHEST THRUST STANDING TECHNIQUE. Place your arms under the arms of the victim, and encircle the lower chest of the victim. Make a fist with one hand and place it on the center of the breast bone, taking care to avoid the lower tip of the breast bone (xiphoid process). With your other hand, grasp your fist and apply pressure to the chest with a quick backward thrust.

CHEST THRUST RECLINING TECHNIQUE. This technique is performed with the victim lying flat, face up. Kneel at the victim's side. Place the heel of one hand on the lower half of the sternum, taking care to avoid the xiphoid process, and cover with the other hand, keeping your fingers off the chest. Give a sharp downward thrust. Each thrust should be delivered distinctly

with the intent of relieving the obstruction. Repeat cycles of chest thrusts and finger sweeps, following the same technique you would use with abdominal thrusts.

SELF-HELP FOR AIRWAY OBSTRUCTION. If you are alone and the victim of an airway obstruction, do not panic; you can help yourself. Using your own fist, you can perform the abdominal thrust maneuver on yourself or, you can use the back of a chair (with a rounded edge) or similar structure to exert abdominal pressure. See figure 2-7.

BREATHING

The second aspect of basic life support is to restore breathing in cases of respiratory arrest (the victim has stopped breathing). Failure of the breathing mechanism may be caused by various factors, including airway obstruction, trauma, suffocation, drowning, electrical shock, and drug overdose. Unless something is done when the victim is not breathing, the heart will soon stop.

ARTIFICIAL VENTILATION

Once the airway has been opened by one of the techniques described above, the victim may start to breathe spontaneously. This can be determined by looking, listening, and feeling. Looking for the rise and fall of the victim's chest, listening for breath sounds, and feeling air movement on exhalation. The signs of respiratory arrest are an absence of respiratory effort, a lack of detectable air movement through the nose or mouth, unconsciousness, and a bluish discoloration of the lips and nail beds. If the person is not breathing, artificial ventilation must be administered.

The purpose of artificial ventilation is to provide a method of air exchange until natural breathing is restored. Artificial ventilation should be given only when natural breathing has stopped; it must not be given to a person who is breathing naturally. Do not assume that a person's breathing has stopped simply because the person is unconscious or has been rescued from the water, from poisonous gas, or from contact with a live electrical wire. Remember: **DO NOT GIVE ARTIFICIAL VENTILATION TO A PERSON WHO IS BREATHING NATURALLY.**

Mouth-to-Mouth Ventilation

To perform mouth-to-mouth ventilation, perform the head tilt-chin lift maneuver to open the airway. Maintaining pressure on the victim's forehead, use your thumb and index finger to pinch the nostrils shut. Take a deep breath, cover the victim's mouth with your own, and exhale into the victim's mouth (figure 2-8). Briefly remove your mouth from the victim's to allow for exhalation. Initially, give two full breaths. Adequate time for the two breaths (1 to 1-1/2 seconds per breath) should be allowed to provide good chest expansion and decrease the possibility of air being forced into the stomach. Observe the victim's chest for movement. Check the victim's

Figure 2-7.—Self-help for airway obstruction.

Figure 2-8.—Mouth-to-mouth ventilation.

neck pulse (carotid artery) as depicted in figure 2-9. If a pulse is present, continue rescue breathing at a rate of 12 ventilations per minute (one breath every 5 seconds).

For infants (children less than 1 year old), seal both the mouth and nose with your mouth. Give two gentle breaths allowing 1 to 1-1/2 seconds for each breath. The initial breaths serve as a means of checking for airway obstruction as well as expanding the lungs. The lungs of a child, and especially an infant are much smaller than those of an adult. Therefore, the volume of air needed for effective ventilation will be less than in an adult and should be limited to the amount needed to cause the chest to rise. Check the infant's upper arm pulse (brachial artery) as shown in figure 2-10. If a pulse is present, continue rescue breathing.

Mouth-to-Nose Ventilation

Mouth-to-nose ventilation is effective when the victim has extensive facial or dental injuries and achieving a mouth seal is difficult or impossible.

To administer this method, seal the victim's mouth with your hand, take a deep breath, and place your lips over the victim's nose and blow. To assist the victim to exhale, you may open the lips. Start artificial ventilation with two full breaths then check the victim's pulse. If a pulse is present, continue rescue breathing at the rate of 12 ventilations per minute.

Figure 2-9.—Check carotid pulse.

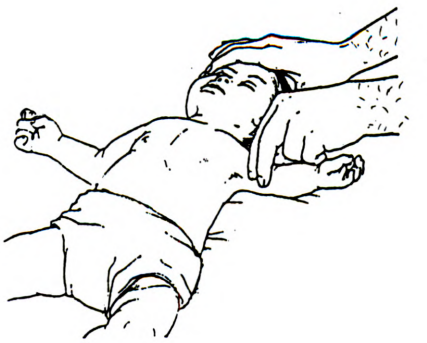


Figure 2-10.—Check infant's pulse.

Mouth-to-Stoma Ventilation

You may be confronted with a victim who has had a laryngectomy (removal of the voice box). A person who has had a laryngectomy breathes through an opening in the front of his neck. This opening is called a stoma. If you are giving this person mouth-to-mouth ventilation, the air will escape through the stoma. To ventilate the victim, you must cover the victim's mouth with your hand, and ventilate through the stoma using the techniques described above.

Mouth-to-Mask Ventilation

There may be times when you will be required to perform artificial ventilation in a contaminated environment, such as a battlefield after a chemical or biological warfare attack. The mouth-to-mask method of artificial ventilation is a modification of the mouth-to-mouth method. A special resuscitation tube is used to deliver uncontaminated air to a casualty. This resuscitation tube has an adapter at one end that attaches to the mask of the rescuer and a molded rubber mouthpiece at the other end for the mouth of the casualty.

Back Pressure Armlift

The back pressure armlift method is a less effective technique used when other methods are not feasible, such as on a battlefield, where gas masks must be worn. Place the victim in the prone position (on his stomach), face to one side, and neck hyperextended with the hands under the head. Quickly clear his mouth of any foreign matter. Kneel at the victim's head and place your hands on his back so that the heels of your hands

lie just below a line between the armpits, with thumbs touching and fingers extending downward and outward (figure 2-11). Rock forward, keeping your arms straight and exert pressure almost directly downward on the victim's back, forcing air out of the lungs. Then rock backward, releasing the pressure and grasping the arms just above the elbows. Continue to rock backward, pulling the arms upward and inward (toward the head) until resistance and tension in the shoulders are noted. This expands the chest causing active intake of air (inspiration). Rock forward and release the victim's arms. This causes passive exiting of air (expiration). Repeat the cycle of press, release, lift, and release 12 times a minute until the victim can breathe spontaneously.

Gastric Distension

Sometimes during artificial ventilation, air enters the stomach instead of the lungs, and the abdomen appears bloated. This condition is called gastric distension. It occurs most often in children but commonly in adults. It is most likely to occur when excessive pressures are used for ventilation or when the airway is obstructed. If gastric distension develops, reopen the airway and decrease the amount of air you are giving, **BUT DO NOT** attempt to expel stomach contents by pressing on the abdomen.

CIRCULATION

The circulatory system is what keeps the "human machine" running. By means of blood, it delivers oxygen and nutrients to the brain and cells of the body and removes waste products and carbon dioxide. The circulatory system is composed of the heart which pumps the blood, and blood vessels which carry the blood to all parts of the body.

Cardiac arrest is the failure of the heart to generate an effective blood flow or the heart has completely stopped beating. Signs of cardiac arrest include the absence of a pulse because the heart is not beating or not beating properly, and the absence of breathing. If the victim is to survive, immediate action must be taken to restore breathing and circulation.

A rescuer who knows how to administer cardiopulmonary resuscitation (CPR) increases the chances of a victim's survival. CPR consists of artificial ventilations and external cardiac (heart) compressions. The lungs are ventilated by the mouth-to-mouth or mouth-to-nose techniques; the compressions are performed by pressing the chest with the heels of your hands. The victim should be lying face up on a firm surface. These actions can be done by a single rescuer.

As mentioned at the beginning of this chapter, CPR should not be attempted by a rescuer who has not been properly trained. To learn this technique, contact your medical department representative for further information on training.

ONE RESCUER TECHNIQUE

The rescuer must not assume that a cardiac arrest has occured simply because the victim is lying on the deck or ground and appears to be unconscious. First, try to arouse the victim by

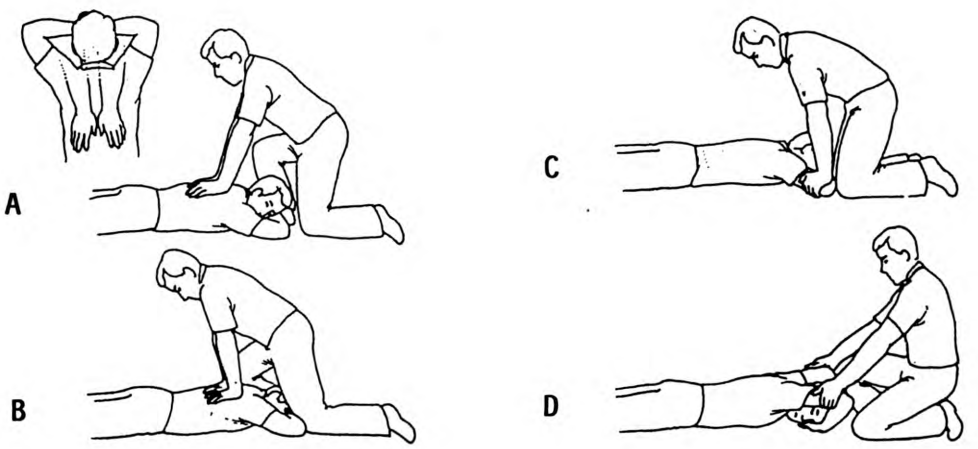


Figure 2-11.—Back pressure arm lift.

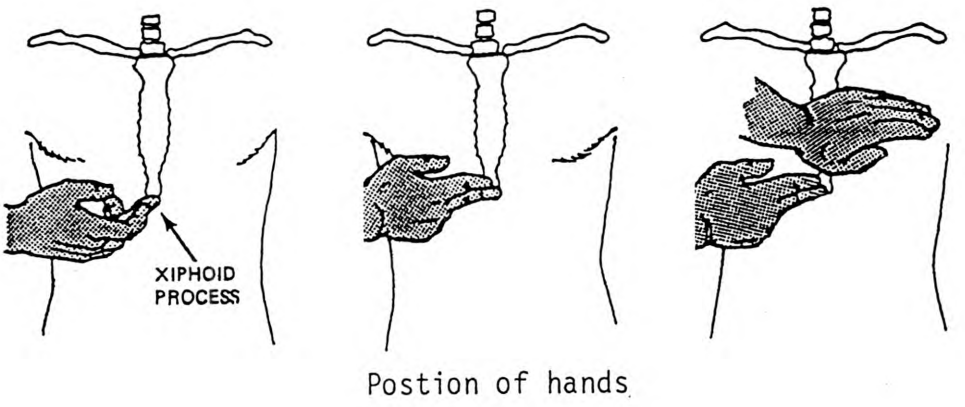


Figure 2-12.—Xiphoid process.

gently shaking his shoulders and trying to obtain a response; loudly ask "Are you OK?" If there is no response, call out "HELP!" to alert others and position the victim face up on a firm surface. Kneel at his side and facing him, open his airway using the head tilt-chin lift or the jaw thrust methods discussed earlier. Look for chest movement. Listen and feel for air coming from his nose for 5 seconds. If breathing is absent, give two slow full breaths then check for a pulse. If the chest does not rise, reopen the victim's airway and attempt to give 2 more breaths. If the chest still does not rise, follow the procedures described above for an obstructed airway. If you are able to ventilate the victim, proceed with the following.

Check the victim for a pulse. If the pulse is absent, and some help has arrived, send a bystander to alert the medical response team or to call 911 for an ambulance. You begin CPR.

Locate the lower margin of the victim's rib cage on the side closest to you by using your middle and index fingers. Then move your fingers up along the lower edge of the rib cage to the notch (xiphoid process) where the ribs meet the sternum (breast bone) in the center of the lower chest. The middle finger is placed on the notch, and the index finger is placed next to it. The heel of the other hand is placed along the midline of the sternum, next to and touching the index finger. You must keep the heel of your hand off the xiphoid process (figure 2-12); a fracture in this area could lacerate (cut) or otherwise damage the liver.

Remove your hand from the notch and place it on top of the hand on the sternum so that both hands are parallel to each other. Only the heel of one hand is in contact with the victim's sternum.

Interlock your fingers or extend them straight out, but they must be kept off the chest! See figure 2-13.

With your elbows locked, apply vertical pressure straight down to depress the adult sternum 1-1/2 to 2 inches. Then release the pressure, keeping the heel of one hand in contact with the chest. This process compresses the heart between the sternum and the victim's back, pumping blood into and through the system. The actual motions must be smooth, rhythmic, and uninterrupted. Short jabbing compressions are ineffective in producing artificial blood flow. If you use proper technique, a more effective compression will result, and you will feel less

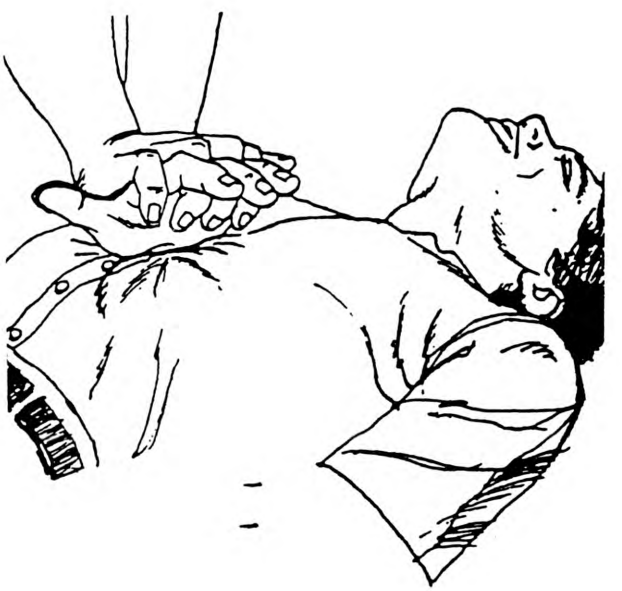


Figure 2-13.—Interlocking fingers to help keep fingers off the chest wall.

fatigue. Ineffective compression occurs when the elbows are not locked, the rescuer is not directly over the sternum, or the hands are improperly placed on the sternum.

When one rescuer performs CPR, he must pause to give artificial ventilation. Then cardiac compressions must be resumed at a rate of 80 to 100 per minute. Vocalize "one, and two, and three," etc., until you reach 15. After every 15 compressions, deliver 2 ventilations (ratio 15 to 2). Continue this ratio for four complete cycles of 15 compressions and 2 ventilations. Then take 5 seconds to check for the carotid pulse and spontaneous breathing. If there are still no signs of recovery, continue CPR. If a periodic check reveals a return of pulse and respiration, discontinue CPR; but, closely monitor the victim's pulse and respirations, and be prepared to start CPR again if required. If a pulse is present but no respirations, continue rescue breathing and check the pulse frequently.

Before moving on to the next technique, review the steps for one person CPR:

1. Determine whether the victim is unconscious.
2. Open the airway (it may be necessary to remove an obstruction).
3. Look, listen, and feel for respirations.
4. Ventilate 2 times.
5. Check the pulse—if none, call for help.
6. Begin the compression-ventilation cycle of 15 compressions to 2 ventilations for 4 complete cycles.
7. Check again for a pulse and breathing after the fourth cycle. If no change, continue the compression-ventilation cycles until the victim is responsive, until you are properly relieved, until you can no longer continue because of exhaustion, or until the victim is pronounced dead by a physician.

CPR WITH ENTRY OF SECOND RESCUER

When a person is administering CPR and another person who knows CPR approaches, the approaching person should tell the rescuer that he knows CPR and that he can help. This person should do two things: first, summon additional help if this has not been done; and second, take over CPR when the first person is tired. The first rescuer will indicate when he is tired; the first person should stop CPR after the next two breaths. The second rescuer should kneel next to the victim opposite the first rescuer, open the victim's airway, look, listen, and feel for breathing, and check for a carotid pulse for 5 seconds. If there is no breathing and no pulse, the second rescuer should deliver 2 ventilations and resume chest compressions.

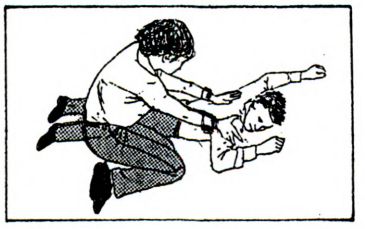
The first rescuer should continue to monitor the effectiveness of the second rescuer's efforts by observing for a chest rise during ventilations and feeling for a carotid pulse during chest compressions. A pulse should be felt during compressions if the compressions are being done correctly. If no pulse is felt, the compression technique should be reevaluated. CPR should be interrupted every few minutes to reevaluate whether the victim's pulse and spontaneous breathing have returned.

CPR FOR CHILDREN AND INFANTS

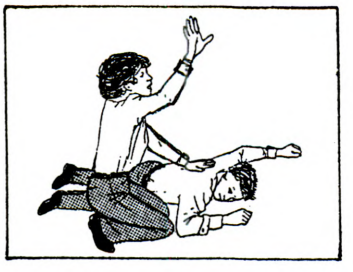
Cardiopulmonary resuscitation for children and infants is similar to that for adults. The primary differences are that, for children (1 to 8 years old), the heel of only one hand is used to depress the lower half of the sternum 1 to 1 1/2 inches. For infants, only two fingers are used to depress the sternum on a line between the nipples from 1/2 to 1 inch at a rate of 100 compressions per minute. For both infants and children, the compression-ventilation ratio is 5 to 1. As stated earlier, the absence of a pulse is determined by using the brachial artery in the infant (figure 2-10). Keep in mind that strong ventilations can damage an infant's or child's lungs. You need only blow air into any victim until you see a chest rise.

NOTE: The diagrams (figure 2-14) on the following pages illustrate the step-by-step One rescuer CPR method discussed in this chapter and will serve as a good review.

1. **Check for Unresponsiveness**
   a. Tap or gently shake victim.
   b. Shout, "Are you OK?"



   c. If no response, shout, "Help!"



2. **Open the Airway** (Use head-tilt/chin-lift)
   a. Place one hand—the one nearer the victim's head—on victim's forehead.
   b. Place 2 fingers of other hand under bony part of lower jaw near chin.
   c. Tilt head and lift jaw. Avoid closing victim's mouth. Avoid pushing on soft parts under chin.

3. **Check for Breathlessness (Is breathing present?)**
   a. Maintain open airway with head-tilt/chin-lift.
   b. Place your ear over victim's mouth and nose.
   c. Look at chest, listen and feel for breathing for 3 to 5 seconds.

4. **Give 2 Full Breaths**
   a. Maintain open airway with head-tilt/chin-lift.
   b. Pinch nose shut.
   c. Open your mouth wide, take a deep breath, and make a tight seal around the outside of the victim's mouth.
   d. Give 2 full breaths. Each breath should last 1 to 1½ seconds. Pause between each breath for you to take a breath.
   e. Look for the chest to rise and fall. Listen and feel for escaping air.

5. **Check for Pulse**
   a. Maintain head-tilt with one hand on forehead.
   b. Locate Adam's apple with middle and index fingers of hand closer to victim's feet.

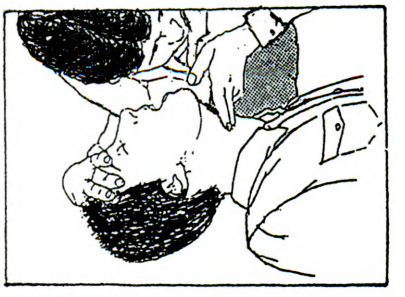


Figure 2-14.—One rescuer CPR method.

c. Slide fingers down into groove of neck on side closer to you.
d. Feel for carotid pulse for 5 to 10 seconds.
e. Say, "No breathing and no pulse."

6. **Phone EMS for Help**
   a. Tell someone to call for an ambulance.
   b. Say, "No breathing, no pulse, call _____" (Local emergency number or Operator).

7. **Do Compression/Breathing Cycles**
   a. Locate lower margin of rib cage and move fingers to the notch where ribs meet the breast bone.
   b. Put middle finger over notch and put index finger next to it. Put heel of other hand next to the index finger over the sternum.
   c. Place other hand on top, interlace fingers to keep fingers off the chest.
   d. Begin 4 cycles of 15 compressions and 2 breaths.
   e. Recheck pulse and respirations.
   f. If no pulse, continue compressions and ventilations.

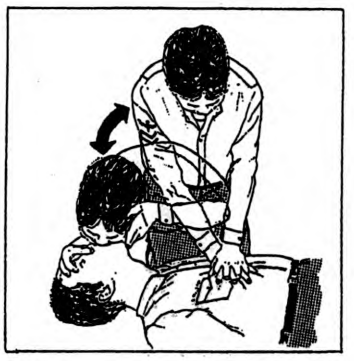


Figure 2-14.—One rescuer CPR method—Continued.

CHAPTER 3

HEMORRHAGE

Blood is a complex, thick, red fluid composed of plasma, red blood cells, white blood cells, and platelets. Plasma is a sticky yellow fluid that carries the blood cells, nutrients and waste products. Red blood cells give color to the blood, and carry oxygen to the cells and carbon dioxide away from the cells. White blood cells serve to guard against infection and attack foreign organisms. Platelets are tiny elements that are essential in the initial formation of a blood clot, the mechanism that stops bleeding.

Blood is circulated throughout the body by means of three different kinds of blood vessels: arteries, veins, and capillaries. **ARTERIES** are large vessels that carry blood away from the heart; **VEINS** are vessels that return blood to the heart; and **CAPILLARIES** form a connecting network of smaller vessels between the veins and arteries.

Hemorrhage is a condition in which there is an escape of blood from the circulatory system due to a break in the wall of one or more blood vessels. In most small cuts, only the capillaries are injured. Deeper wounds result in injury to veins or arteries. Injury to the capillaries is generally not serious and can usually be controlled by a small bandage strip or pad. Injury to veins or arteries is serious and can endanger life. The average body contains 5 to 6 quarts or liters of blood (10 to 12 pints). The body can generally lose 1 pint of blood without harmful effects; in fact, this is the amount that is usually given by blood donors. A loss of 2 pints will usually cause shock, and shock becomes greater as the amount of blood loss increases. If one half the blood supply in the body is lost, death usually results.

Capillary blood is usually brick red in color. If capillaries are cut, the blood oozes out slowly. Blood from veins is dark red. If a vein is cut, the blood escapes in a steady stream. If an artery near the skin surface is cut, the blood will gush out in spurts that are synchronized with the heart beats; but if the artery is deeply buried, the bleeding will appear in a steady stream. Arterial blood is usually bright red in color.

In actual situations, you may find it difficult to distinguish whether the bleeding is arterial or venous, but the distinction is not important. A person can bleed to death quickly from a cut artery. Prolonged bleeding from any large cut can, of course, have the same effect. The important thing to know is that all bleeding must be controlled as quickly as possible.

CONTROL OF HEMORRHAGE

When administering first aid to a bleeding victim, you must remain calm. Loss of blood is a dramatic event and always appears severe. In fact, most bleeding is less severe than it may appear to be at first glance. Most of the major arteries are deep and well protected by tissue and bony prominences. Although bleeding can be fatal, you will usually have enough time to think and act calmly before the victim expires. Remember that most errors in first aid are made because of acting without thinking.

The four methods for controlling hemorrhage are direct pressure, elevation, indirect pressure, and the use of a tourniquet.

DIRECT PRESSURE

Direct pressure is the first and most effective method to use when you are trying to control hemorrhage. In almost every case, bleeding can be stopped by the application of pressure directly

on the wound, as illustrated in figure 3-1. Use a sterile first aid dressing, when available, and tie the knot directly over the wound, only tight enough to stop the bleeding. Any clean material can be used in the absence of regular first aid dressings. If bleeding does not stop, firmly apply another dressing over the first dressing, or apply direct pressure with your hand or fingers over the dressing. If there is not material available, simply thrust your hand onto the wound and apply pressure. This pressure may be applied by the victim himself or by a buddy. Under no circumstances is a dressing to be removed once it has been applied.

In cases of severe hemorrhage, do not worry too much about the dangers of infection. Although the prevention of infection is important, the basic problem is to stop the flow of blood.

ELEVATION

Elevating or raising an injured limb above the level of the heart will help control bleeding. Elevation should be used together with direct pressure. However, do not elevate a limb if a fracture is suspected until the fracture has been splinted and you can be reasonably certain that elevation will not cause further injury. Use a stable object to maintain elevation; propping the limb on an unstable object may do more harm than good.

INDIRECT PRESSURE

In instances of severe bleeding where direct pressure and elevation are not adequately controlling the bleeding, indirect pressure may be added. Bleeding from a cut artery or vein may often be controlled by applying pressure to the appropriate pressure point. A pressure point is a place where a main artery lies near the skin surface and over a bone or firm tissue. Pressure at such a point is applied with the fingers, thumb, or heel of the hand; no first aid materials are required. The object of the pressure is to compress the artery against the underlying firm surface, thus slowing the flow of blood to the wound.

Figure 3-1.—Direct pressure.

When the use of indirect pressure at a pressure point is necessary, do not substitute indirect pressure for direct pressure; use both. Figure 3-2 shows the locations of pressure points and the area of blood flow they control. Pressure points in the arms (brachial) and in the groin (femoral) are the ones most often used in first aid. These pressure points should be thoroughly understood.

Pressure on the brachial artery is used to control severe bleeding from an open wound on the upper extremity (arm). This pressure point is located above the elbow on the inside of the arm in the groove between the muscles (biceps and triceps muscles). Using either your fingers or thumb, apply pressure to the inside of the arm over the bone. Figure 3-2E shows the proper location for the digital pressure.

The femoral artery is used to control severe bleeding from a wound on the lower extremity (leg). The pressure point is located in the center part of the crease in the groin area. This is where the artery crosses the pelvic basin on the way into the lower extremity. To apply pressure, position the victim flat on his back, if possible. Kneel on the opposite side from the wounded limb, place the heel of one hand directly on the pressure point, and lean forward to apply pressure on the artery as shown in figure 3-2H. If bleeding is not controlled, it may be necessary to press directly over the artery with the flat surface of the fingertips and to apply additional pressure on the fingertips with the heel of your other hand.

TOURNIQUET

A tourniquet should be used only as a last resort for severe, life-threatening bleeding that cannot be controlled by any other method. First aid providers should thoroughly understand the dangers and limitations of its use. A tourniquet may be dangerous; its application may cause tissue injury or even loss of the injured limb. It is only rarely required and should be used only in cases of partial or complete severance of a limb or when bleeding is uncontrollable.

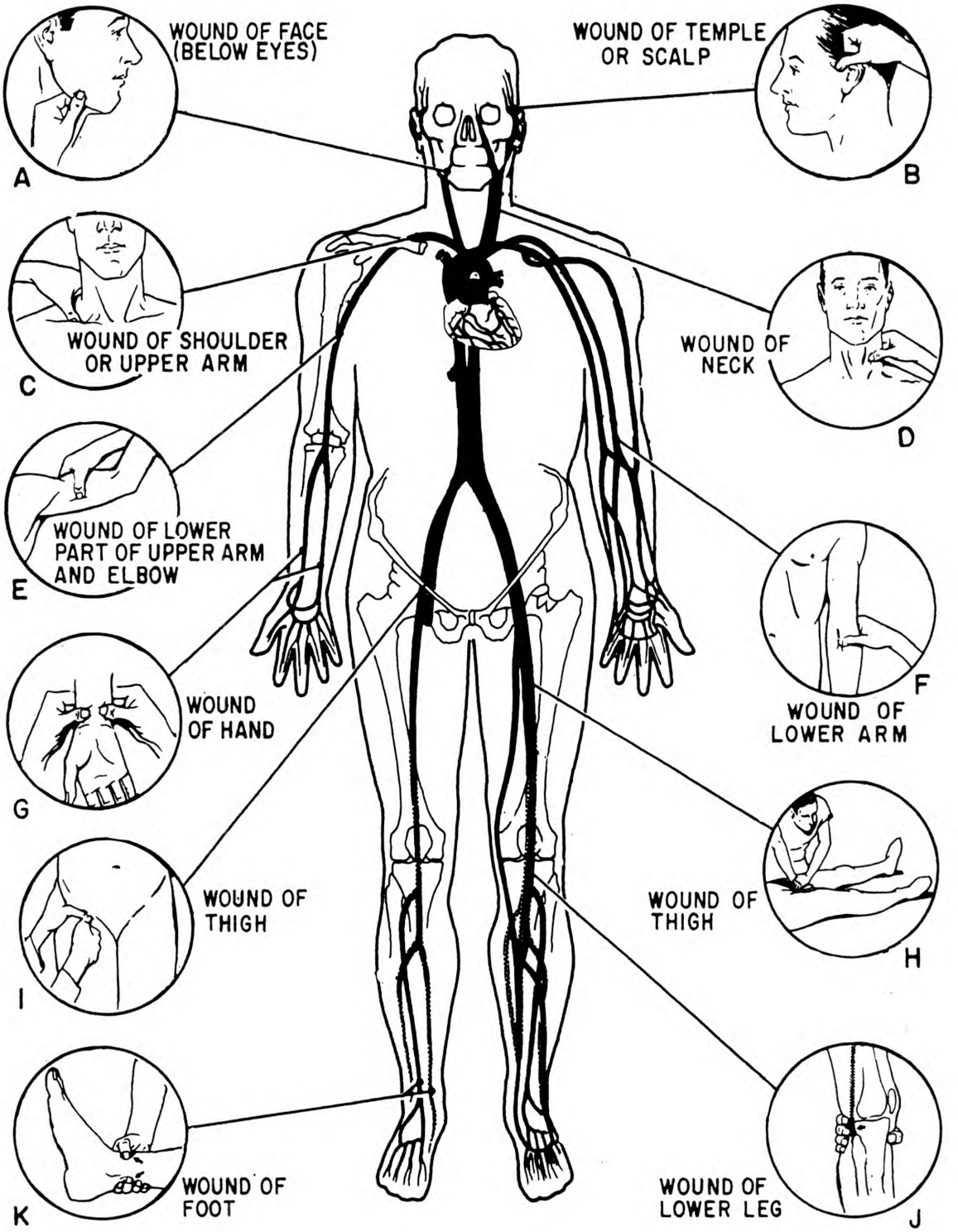


Figure 3-2.—Pressure points for control of bleeding.

The standard tourniquet is usually a triangular bandage folded until it is 3 or 4 inches wide and about 6 to 8 layers thick. A tourniquet can be improvised from a strap, belt, neckerchief, or other similar material. A tourniquet should be at least 2 inches wide to distribute pressure over tissues. Never use wire, cord, or anything that will cut into the flesh.

To apply an emergency tourniquet made from material resembling a cravat or neckerchief, wrap

the material twice around the limb, and tie an overhand knot. Place a short stick on the overhand knot and tie a square knot over it. Then twist the stick to tighten the tourniquet; tighten it only tight enough to stop the bleeding. The stick may be tied in place with another strip of material. Figure 3-3 demonstrates the proper method for applying a tourniquet.

Here are some major points that you must know about the use of a tourniquet:

1. Do not use a tourniquet unless you cannot control the bleeding by any other means.
2. Do not use a tourniquet for bleeding from the head, face neck or body. Use it only on the limbs.
3. Always apply a tourniquet between the wound and the heart, making it as close to the wound as possible. Never place a tourniquet below the knee or elbow; nerves and vessels lie close to the surface and may be damaged.
4. Make sure you draw the tourniquet tight enough to stop the bleeding but do not make it any tighter than necessary.
5. Never loosen a tourniquet once it has been applied. The loosening of a tourniquet may dislodge clots and result in enough blood loss to cause shock and death.
6. Do not cover a tourniquet with a dressing. If it is necessary to cover the injured person, make sure that all the other people concerned with the case know about the tourniquet. Using crayon, skin pencil, or blood, mark a large "T" on the victim's forehead and on a medical tag attached to the victim's wrist. The time that the tourniquet was applied must also be indicated.

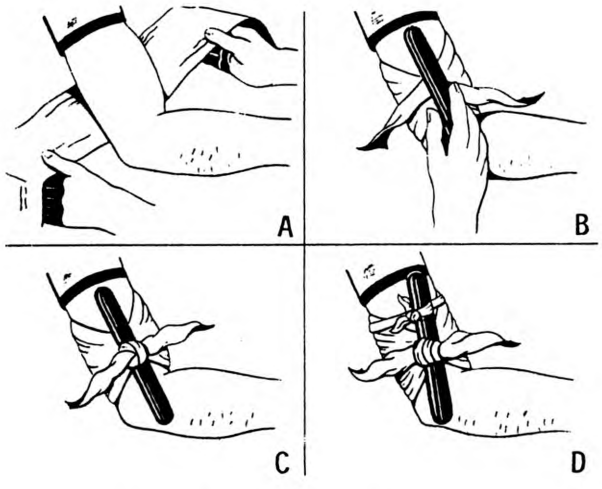


Figure 3-3.—Applying a tourniquet.

INTERNAL HEMORRHAGE

Although not usually visible, internal bleeding can be very serious. The victim with severe internal hemorrhage may develop shock before the rescuer realizes the extent of blood loss. Bleeding, however slight, from any body orifice is considered serious; it usually indicates an internal source of bleeding.

Internal bleeding may be caused by deep wounds or by heavy blows that rupture internal organs or may be the result of a fracture. Probably the most common sign of internal bleeding is a bruise or contusion; it indicates bleeding into the soft tissues and may be seen after a slight or a severe injury. Signs that indicate internal bleeding but are not seen on the body surface include those signs that indicate the development of shock: a weak thready pulse; dull, glassy eyes with dilated pupils; cold, moist, pale skin; thirst; dizziness; and nausea and vomiting.

Examples of internal hemorrhage include bleeding from an ulcer, a lacerated liver or spleen, or a closed fracture of a bone. A person with a bleeding ulcer may lose a large amount of blood internally very quickly; fractured ribs may cause severe bleeding into the chest. A person with a laceration of the liver or spleen may lose a considerable quantity of blood into the abdominal cavity. Ordinarily, in addition to the signs and symptoms of shock, this victim will have a tender abdomen which progressively distends.

First aid control of internal hemorrhage in the field is virtually impossible; control of internal hemorrhage usually requires surgical intervention. The exception to this is with fractures; often, application of a splint to a badly injured extremity will allow prompt control of bleeding associated with the injury.

EMERGENCY SITUATIONS

Bleeding from most external wounds is fairly easy to control. However, when some of the larger arteries are cut, hemorrhage may be so rapid that death will result within a few minutes. The possible methods of controlling the flow of blood in some of these emergency situations are briefly described below.

Wounds of the neck are often caused by sharp objects such as knives, razors, and glass fragments. Sometimes the large artery is cut, sometimes the large vein, and sometimes both. In any event, the blood loss will be extremely rapid.

It may be possible to control the bleeding from these wounds by applying hand pressure above and below the cut; such pressure must be maintained until a physician gives further instructions. It is a good idea to use cloth under your hands if any is available, because the blood makes the neck very slippery and difficult to hold.

If the large artery in the leg is cut, the bleeding will be very rapid. At least partial (and perhaps complete) control of the hemorrhage can be attained by immediately applying extreme pressure directly over the wound. Cover your clenched fist with any clothing or other cloth that is available and thrust your fist directly onto the wound. If no cloth is available, use your fist alone; but you will find it more difficult to control the bleeding by this method because your fist and the wound will both become very slippery. If a tourniquet becomes necessary, continue to apply direct pressure with your hand while the tourniquet is being applied.

GENERAL FIRST AID MEASURES

In addition to knowing how to control serious bleeding by the application of pressure, you must be familiar with the following measures that are important in the first aid treatment of a person who has suffered severe bleeding. Any person who has lost a large amount of blood must be treated by medical personnel as soon as possible. In the meantime, you can greatly improve his chances for recovery by treating him for shock as soon as possible and by keeping the person quiet.

Shock is always present in persons who have lost a great amount of blood. If you do not notice symptoms of shock, treat the victim for it anyway. Since the measures used to prevent shock are the same as those used to treat it, you may prevent its occurrence or, at least, lessen its severity.

Equally important, you must keep the victim quiet. Try to keep him from getting excited. Do not move him unnecessarily, and do not handle him roughly. Keeping him quiet will allow a clot to form in the wound and will also help to prevent the occurrence of shock. Try in every way to be careful and gentle in handling the victim, and do everything you can to make him as comfortable as possible under the circumstances.

CHAPTER 4

SHOCK

You will recall that in our discussion of hemorrhage in chapter 3, we said that the loss of 2 or more pints of blood will usually cause shock. You should also know that shock can occur with any injury. And, in fact, some degree of shock usually accompanies any injury. You should, therefore, consider shock whenever handling a person who has been injured.

The term "shock" has a variety of meanings. For example, it sometimes means receiving an electrical charge, or the reaction to bad news, fright, or other emotional stress. In this chapter, shock relates to the collapse and failure of the circulatory system. To be specific, shock is a condition in which the circulation of the blood is seriously disturbed resulting in a lack of oxygen to body systems.

To understand how shock develops, let us look at what happens when you hit the end of your finger with a hammer. Your whole body responds. Since your finger hurts, you might think that it is the only part of you that is responding to the injury; but in fact, a great many changes are taking place in your body while you are concerned with the immediate pain. Your body AS A WHOLE is injured and your body AS A WHOLE attempts to recover from the injury. A series of changes take place, designed to restore the body to its normal, healthy condition.

Sometimes, however, the changes that occur may in themselves cause further damage to the body. To some extent, this is what happens in shock. When a person is injured, the blood flow in his entire body is disturbed. To overcome this difficulty, the heart beats faster and the blood vessels near the skin and in the arms and legs constrict, thus sending most of the available blood supply to the vital organs of the body and to the nerve centers in the brain that control all vital functions.

While this is occurring, the other tissues do not receive enough blood and therefore do not get enough oxygen or food. The blood vessels, like the rest of the body, suffer from this lack and eventually lose their ability to constrict. When this happens, the vital organs and the brain do not receive enough blood, and the condition of shock becomes worse and worse. If this continues, the present damage becomes so extensive that recovery is impossible. In less severe cases, prompt first aid treatment for shock may mean the difference between life and death. In mild cases of shock, recovery usually occurs naturally and rather quickly. As we shall see, the measures used to combat shock are aimed at helping the body to recover from the disruption of the circulatory system.

CAUSES OF SHOCK

Serious shock occurs as a result of severe injury to any part of the body. Crush injuries, fractures, burns, poisoning, and prolonged bleeding are very likely to cause serious shock. An interruption of breathing, from whatever cause, is usually followed by severe shock. Blast and concussion injuries, caused by pressure waves resulting from the detonation of high explosives in the air or under water, may severely damage the internal organs of the body and cause extensive shock. Signs of shock are sometimes the only outward indication of a blast or concussion injury. As noted above, any damage to the body is accompanied by or followed by some degree of shock.

There are a number of factors that affect the seriousness of shock. Age, for example, is often a determining factor. Very young children and very old people do not usually have as much resistance to shock as do young or middle-aged adults. Pain can induce shock, or increase its severity. People who have been starved, deprived of water, or exposed to the extremes of cold or heat can go into shock very easily. Excessive fatigue can increase the severity of shock. In general, people who have any chronic illness are more likely to go into shock than healthy

individuals. In addition to these factors, there are some unexplained differences between individuals in regard to their resistance to shock—an injury that might cause shock in one person could cause serious, perhaps fatal, shock in another.

There are many different causes and types of shock. It is not within the scope of this text to identify them all here. You should remember that shock is certain to accompany or follow any serious injury and is often the most serious consequence of the injury.

HOW TO RECOGNIZE SHOCK

A person who is going into shock may show quite a few signs or symptoms. Some of these are indicated in figure 4-1 and are discussed below. Remember, however, that the signs of shock do not always appear at the onset of the injury; in fact, in many very serious cases, the signs may not appear until hours later.

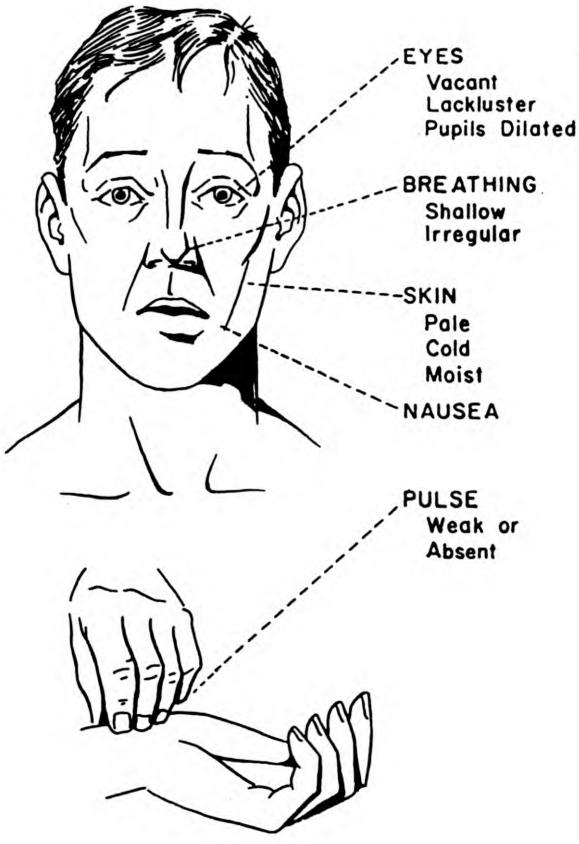


Figure 4-1.—Symptoms of shock.

The symptoms shown by a person suffering from shock are, directly or indirectly, due to the fact that the circulation of the blood is disturbed. The pulse is weak and rapid. Breathing is likely to be shallow, rapid and irregular, because the poor circulation of the blood affects the breathing center in the brain. The temperature near the surface of the body is lowered because of the poor blood flow; therefore, the face, arms, and legs feel cold to the touch. Sweating is likely to be very noticeable. A person in shock is usually very pale, but in some cases there may be a bluish or reddish color to the skin. The pupils of the eyes are usually dilated (enlarged).

If the victim is conscious, he may complain of thirst. He may have a feeling of weakness, faintness, or dizziness. He may feel nauseous. Also, the person may be very restless and feel frightened and anxious. As shock deepens, these signs gradually disappear and the victim becomes less and less responsive to what is happening around him. Even pain may not arouse him. Finally, the victim may become unconscious.

It is unlikely that you will see all these symptoms of shock in any one case. Some of them appear only in the late stages of shock when the disturbance of the blood flow has becomes so great that the victim's life is in serious danger. Sometimes the signs of shock may be disguised by other signs of injury. It is important to know what symptoms indicate the presence of shock, but do not ever wait for symptoms to develop before beginning the treatment for shock. Remember, **EVERY SERIOUSLY INJURED PERSON IS LIKELY TO DEVELOP SERIOUS SHOCK.**

PREVENTION AND TREATMENT OF SHOCK

In many emergency situations, the most helpful thing you can do for an injured person is to begin treatment for shock. If shock has not yet developed, the treatment may actually prevent its occurrence; if it has developed, you may be able to keep it from reaching a critical point. As we have seen, shock creates a vicious cycle; the worse it is, the worse it becomes. It is extremely important that you begin treatment at the earliest opportunity.

It is important to keep the victim as calm as possible. Excitement and fright will affect his condition and may even bring on shock. Try to prevent the victim from seeing his injuries, and

reassure him that he will be properly cared for. Keep all unnecessary persons away, as their conversation regarding the victim's injuries may increase his agitation.

Although a person in shock is often thirsty, the rule of treatment is to **GIVE NOTHING BY MOUTH.** Alcoholic beverages are never given to treat shock. They increase the blood supply to surface vessels defeating the body's attempt to compensate. Stimulants such as coffee or tea have little or no value in treating shock. The intense thirst that frequently accompanies shock can be alleviated by allowing the victim to chew or suck on a moistened piece of cloth.

Heat is important in the treatment of shock to the extent that the injured person's body heat must be conserved. Exposure to cold, with resulting loss of body heat, can cause shock to develop or to become worse. You will have to judge the amount of covering to use by considering the weather and the general circumstances of the accident. Often, a light covering will be enough to keep the casualty comfortable. Wet clothing should be removed and dry clothing provided, even on a hot day. Use blankets or any dry material to conserve body heat. Artificial means of warming should not be used as they may be harmful to the person in shock. The basic premise is to keep the victim warm enough for comfort without overheating him.

Relief of pain can also help alleviate the effects of shock. It is a false generalization that all extensive injuries are associated with severe pain and that the more severe the injury, the greater the pain. In reality, severe and even fatal injuries may be considerably less painful than a superficial, mild injury, such as a mashed fingertip which can cause agony.

Another generalization is that, with similar injuries, everyone experiences the same amount of pain. This, too, is incorrect. Some feel pain more intensely than others. Also, those who would not be in much pain from a wound when they are rested, relaxed, and confident might experience severe pain from the same wound if they are exhausted, tense, and fearful. Persons in shock tend to feel less pain. However, pain, unless relieved, may cause or increase shock.

Relief of pain can often be accomplished without the use of drugs. Pain can often be relieved by furnishing adequate support for an injury. Fractures of bones in which the surrounding tissue swells rapidly are extremely painful when left unsupported. Adequate immobilization of fractures not only relieves pain but prevents further tissue damage and shock. Needless suffering can often be eliminated by unlacing or slitting a shoe, or loosening tight clothing in the region of the injury. Often a simple adjustment of a bandage or splint will be of much benefit, especially when accompanied by a few encouraging words.

The injured person should be assured and made to realize that his injuries are understood and that he will get the best possible care. He should also be told of plans to get medical help or plans to move him to a place where medical assistance is available.

SHOCK POSITION

The best position to use for the prevention or treatment of shock is one that encourages the flow of blood to the brain. If it is possible to place the injured person on his back on a bed, cot, or stretcher, you can raise the lower end of the support about 12 inches so that his feet will be higher than his head, as illustrated in figure 4-2. If the circumstances of the accident make it impossible to do this, it might still be possible for you to raise his feet and legs enough to help the blood flow to the brain. Sometimes it is possible to take advantage of a natural slope of ground and place the casualty so that his head is lower than his feet.

In every case, of course, you will have to consider what type of injury is present before you can decide on the best position. For example, a person with a chest wound may have so much trouble breathing that you will have to raise his head slightly or place him in a semi-sitting position. If the face is flushed rather than pale, or if you have any reason to suspect a head injury, do not raise the feet. Rather, you should keep the head level with or slightly higher than the feet. If the person has broken bones, you will have to immobilize the fractures before you move the victim, particularly with a spinal fracture. A fractured spine must be immobilized before any

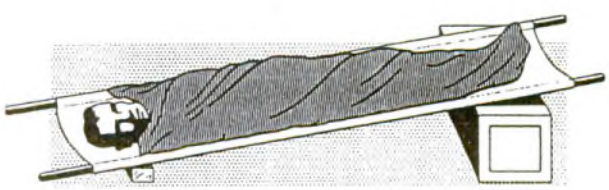


Figure 4-2.—Position for treatment of shock.

attempt is made to move the victim. If you have any doubts about the correct position to use, have the victim lie flat on his back. The basic position for treating shock is one in which the head is lower than the feet. Do the best you can, under the particular circumstances, to get the injured person into this position. In any case, never let a seriously injured person sit, stand, or walk around.

In summary, the treatment for shock is as follows:

1. Secure and maintain an open airway.
2. Control all obvious bleeding by direct pressure.
3. Splint fractures. Splinting may lessen bleeding and minimize pain and discomfort.
4. Elevate the lower extremities about 12 inches.
5. Prevent loss of body heat by putting blankets over and under the victim. Do not, however, overheat the victim.
6. Do not give the victim anything to eat or drink.
7. Transport to a definitive medical treatment facility as soon as possible.

CHAPTER 5

WOUNDS TO SOFT TISSUES

Any injury that causes a break in the skin, underlying soft tissue structures, or other body membranes is known as a WOUND. Injuries to soft tissues can range from simple bruises and abrasions to serious lacerations and impaled objects. The two main dangers involved in this type of injury are **BLEEDING** and **INFECTION**. Serious bleeding was discussed in chapter 3. In this chapter, we will discuss the classification of wounds, the general treatment of specific wounds, and the use of dressings, compresses, and bandages in the first aid treatment of wounds, and the standard Navy first aid kits.

TYPES OF WOUNDS

Because soft tissues are the first line of defense against most injuries, they are often damaged. Essentially, there are two types of soft tissue injuries: open and closed. An open wound is one in which the skin surface has been broken, a closed wound is where the skin surface is intact but underlying tissues have been damaged.

CLOSED WOUNDS

A blunt object that strikes the body will crush tissues beneath the skin. When the damage is not too extensive, this injury is called a **CONTUSION** or **BRUISE**. When tissue is crushed, blood and tissue fluids accumulate under the skin causing discoloration and swelling with associated pain. Generally, no specific treatment is required, but cold packs applied to the wound can minimize the swelling and discomfort. With large areas of bruising, shock may develop and should be treated.

HEMATOMAS are the result of blunt injury resulting in more extensive soft tissue damage, tearing of blood vessels, with the pooling of larger amounts of blood beneath the skin. Hematomas will occur whenever a large vessel is damaged, and often occur when a large bone is broken. Treatment consists of the application of cold packs, direct pressure (compression) over the injury site, and splinting and elevation of the injured part.

OPEN WOUNDS

In open soft tissue injuries, the protective skin layer has been damaged. This damage can result in more extensive bleeding. More importantly, once the protective skin layer has been broken, the wound becomes contaminated and may become infected.

When you consider the manner in which the skin or tissue is broken, there are five general kinds of wounds: abrasions, avulsions, incisions, lacerations, and punctures. Many wounds are a combination of two or more of these basic types.

Abrasions

Abrasions are made when the skin is rubbed or scraped off. Rope burns, floor burns, and skinned knees or elbows are common examples of abrasions. This kind of wound can become infected quite easily, because dirt and germs are usually ground into the tissues. There is usually minimal bleeding or oozing of clear fluid.

Avulsions

An avulsion is an injury in which a piece of skin is either torn completely loose from all its attachments or is left hanging as a flap. Usually, there is a large amount of bleeding. If possible, obtain the tissue that has been removed and wrap it in a cool moist towel and send it with the victim to a medical treatment facility; such tissue can often be successfully reattached. If the torn part is still attached, care must be taken when dressing the wound. The flap must be replaced in such a manner that the attachment tissue is not twisted or crushed. Twisting or crushing the attachment tissue cuts off blood supply to the flap and it will die.

Incision

Incisions, commonly called cuts, are wounds made by sharp cutting instruments such as knives, razors, or broken glass. Incisions tend to bleed freely because blood vessels are cut straight across and not crushed. The wound margins are smooth and there is relatively little damage to the surrounding tissues. Of all the classes of open wounds, incisions are the least likely to become infected.

Laceration

Lacerations are wounds that are torn rather than cut. They generally have ragged, irregular edges and torn tissues beneath. These wounds are usually made by blunt forces rather than sharp cutting objects. A cutting wound made by a dull knife is more likely to be a laceration than an incision. Many of the wounds caused by machinery accidents are lacerations, complicated by crushed tissues. Lacerations are frequently contaminated with dirt, grease, or other material that is ground into the wound; they are very likely to become infected.

Puncture

Punctures are caused by objects that penetrate some distance into the tissues while leaving a relatively small surface opening. Wounds made by nails, needles, wire, knives, and bullets are usually punctures. As a rule, small puncture wounds do not bleed freely; however, large puncture wounds may cause severe internal bleeding. The possibility of infection is great in all puncture wounds, especially if the penetrating object is contaminated. This is particularly true if the contaminating agent is Clostridium Tetani, the agent that causes tetanus, or lockjaw.

A subgroup of puncture wounds is perforating, or through-and-through wounds. This is when the penetrating object enters the body and penetrates through or exits the other side.

FACTORS AFFECTING MANAGEMENT OF WOUNDS

Wounds may be classified according to their general condition, size, location, manner in which the skin or tissue is broken, and the agent that caused the wound. It is usually necessary for you to consider some or all of these factors in order to determine what first aid treatment is appropriate for a wound.

GENERAL CONDITION

In general, the condition of the wound will help to determine the kind of first aid care you will administer to the victim. All open wounds are considered contaminated. Contamination occurs when the protective covering of the skin is broken. Once contaminated, the wound is at risk of infection. In a fresh wound that is clean, care must be taken to ensure that it stays clean and does not become infected. If the wound is already infected, keep the wound dressed to ensure that no further contamination of the wound occurs. If medical treatment will be delayed, an infected wound can be treated with warm, wet dressings, that are changed every hour. In the case of a dirty wound, clean off the gross contamination around the wound, but do not attempt to get the wound itself clean. This will be done under the supervision of a medical officer. Rubbing, brushing, or washing an open wound will only cause further bleeding and possibly further embed material into the tissues.

SIZE OF THE WOUND

Generally, large wounds are more serious than small ones since they usually involve more severe bleeding, more damage to the underlying tissues and organs, and a greater degree of shock. However, small wounds are sometimes more dangerous than large ones, because they may become infected more readily due to neglect. The depth of the wound is also important because there may be complete perforation of an organ or the body, with the additional complication of entrance and exit wounds.

LOCATION OF THE WOUND

Since a wound may involve serious damage to the deeper structures, as well as to the skin and tissues immediately below it, the location of the wound is an important consideration. For example, a knife wound to the chest is likely to puncture a lung and cause serious interference with breathing. The same type of wound in the abdomen may cause a dangerous infection or bleeding in the abdominal cavity, or puncture the intestines, liver, kidneys or other vital organs. A knife wound to the head may cause brain damage, but a knife wound to the arm or leg is relatively simple in comparison.

CAUSES OF THE WOUND

Although it is not always necessary to know what agent or object has caused a wound, it is frequently helpful. Knowing what has caused the wound may give you some idea of the probable size of the wound, its general nature, the extent to which it is likely to be contaminated with foreign matter, and what special dangers must be guarded against.

GENERAL TREATMENT OF WOUNDS

The first aid treatment for all wounds consists mainly of stopping the flow of blood, treating for shock, and preventing infection.

When you are treating a person with multiple wounds, treat the wounds that appear to be most life-threatening first. Since the majority of the body is covered by clothing, be sure that you check all possible points of the body for injury, even if it is not readily apparent. For example, it may take a large amount of blood to soak through a coat before it is noticeable on the outside, but that does not mean that there is no injury under the coat. Usually it is better to tear or cut clothing away from the wound rather than attempt to remove it in a normal manner because excessive motion of the injured part will cause pain and possible additional tissue damage.

STOPPING THE FLOW OF BLOOD

After establishing an airway, the prime concern is to stop the bleeding, preferably by direct pressure. Pressure points and tourniquets should be used only if direct pressure does not control the bleeding. Control of bleeding is discussed in Chapter 3.

A dressing that is properly applied should adequately control the bleeding. In the case of heavy bleeding, as could be associated with an amputation, you may need to double up on the dressing. Never remove a dressing that is soaked with blood to replace it with another one; just place the new dressing over the old one. Elevation of an injured limb will assist in slowing blood flow.

TREATING FOR SHOCK

Shock is likely to be severe in a person who has lost a large amount of blood or suffered any serious wound. As discussed in chapter 4, keep the casualty lying down on his back, with his feet and legs somewhat elevated unless, of course, the injuries preclude this position. Be sure the victim is comfortably warm but not overheated.

PREVENTING INFECTION

The treatment of infected wounds is ordinarily a problem for medical personnel. However, you must know something about infected wounds so that you will know what to do if medical help is not available.

Any break in the skin or other body membrane (such as the mucous membrane that lines the nasal passages) is dangerous because it allows microorganisms (germs) to enter the wound.

Infections are dangerous, especially in the area of the nose and mouth. From this area, infections spread very easily into the bloodstream, causing septicemia (blood poisoning), and into the brain, causing abscesses and infections there. Boils, carbuncles, and infected hair follicles just inside the nostril are perhaps the most common infections that occur in this area. Figure 5-1 shows this danger area.

Never cut or squeeze an infected wound; never attempt to open it in any way. The pus or matter that is usually present in an infected wound contains both dead and live microorganisms. If you try to open the wound, you will probably force some of the living organisms into the blood

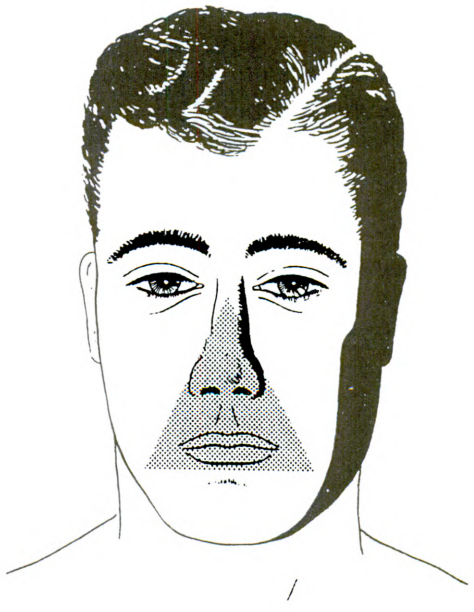


Figure 5-1.—Danger zone for infection.

stream, where they will be carried to every part of the body. Serious, sometimes fatal general infection can result. The proper treatment for infected wounds is warm compresses and antibiotics, under the supervision of medical personnel.

Although an infection can occur in any wound, it is a particular danger in wounds that do not bleed freely, wounds in which torn tissues or skin falls back into place and prevent the entrance of air, and wounds that involve crushing of tissues. Incisions, in which there is a free flow of blood and minimal damage, are the least likely to become infected.

Minor superficial wounds should be washed immediately with soap and clean water, dried, and painted with a mild, nonirritating antiseptic. Apply a dressing, if necessary. You should not make any attempt to wash or clean a large wound, and you must not apply any kind of antiseptic. Merely cover the wound with a dry, sterile compress, and fasten the compress in place with a bandage. Further treatment of larger wounds should be administered by medical personnel only.

Remember that **PUNCTURE WOUNDS** are very likely to become infected. In particular, tetanus (sometimes called lockjaw) is likely to develop from a puncture wound unless preventive treatment is given in time. All puncture wounds are dangerous and must be treated by medical personnel.

REMOVING FOREIGN OBJECTS

Many wounds contain foreign objects. Wood or glass splinters, bullets, metal fragments, bits of wire, fishhooks, nails, tacks, cinders, and small particles from grinding wheels are examples of the variety of objects or materials that are sometimes found in wounds. In some cases, first aid treatment may include the removal of these objects if the wound is minor, and the object is near the surface and exposed. However, first aid does not include the removal of deeply embedded objects, powdered glass, or any widely scattered material of this nature. You should never attempt to remove bullets, but you should try to find out whether the bullet remains in the victim by looking for both entrance and exit wounds. The general rule is as follows: Remove foreign objects from a wound ONLY when you can do so easily and without causing further damage; but **NEVER HUNT FOR OR ATTEMPT TO REMOVE DEEPLY EMBEDDED OR WIDELY SCATTERED OBJECTS OR MATERIALS.**

In many cases, a curved or barbed object, such as a fishhook, may be easily removed. Figure 5-2 illustrates one method of removing a fishhook that has become embedded in the flesh. As you can see from figure 5-2A, the barb on the hook prevents its direct removal. However, if you push the hook forward through the skin, as shown in figure 5-2B, you can clip off the barb with a wirecutter or similar tool, as shown in figure 5-2C. The remainder of the fishhook can then be withdrawn in the manner indicated in figure 5-2D. If the hook is embedded in the face, do not try to remove it. Dress the wound so that the hook does not move and transport the victim to a medical treatment facility.

TREATMENT OF SPECIFIC WOUNDS

It is virtually impossible to place all wounds into simple categories. Some require special treatments or precautions. The following information will deal with some of these specific wounds.

You may come across wounds that may not be described here, but most wounds can be treated by remembering the general treatment of

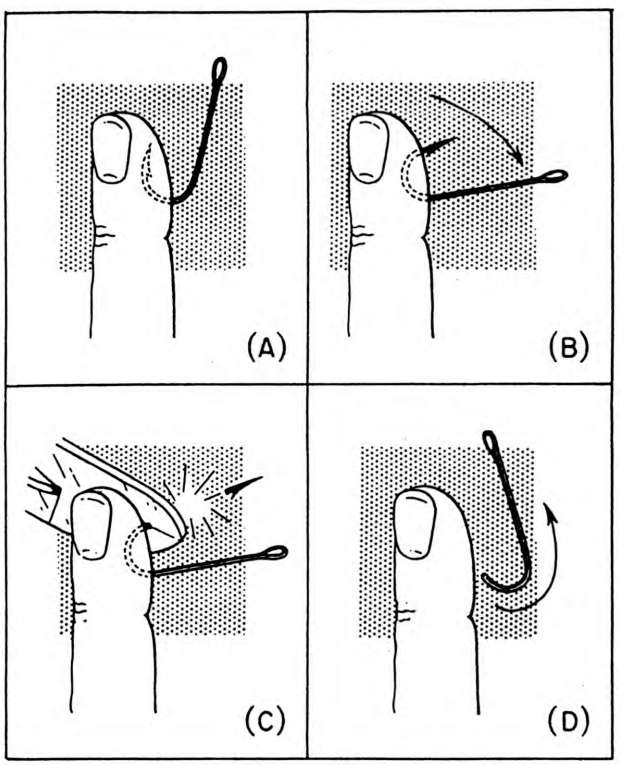


Figure 5-2.—Removing a fishhook.

wounds. Now let us consider some particular wounds that have not been covered earlier.

AMPUTATIONS

Traumatic amputations are serious injuries that occur when the fingers, hands, arms, or legs are torn off in an accident. Bleeding is usually heavy and requires immediate attention to control it. The use of a tourniquet should be as a last resort, but in a major amputation, you will probably need to use one due to heavy bleeding. Once you put a tourniquet on, do not loosen or remove it.

EYE WOUNDS

Many eye wounds contain foreign objects, such as dirt, coal, cinders, eyelashes, bits of metal, and a variety of other objects that may become lodged in the eye. Foreign bodies are discussed in Chapter 10.

If you come across someone who has an object sticking out of the eye, have the victim lie down and try to keep the person calm. Ensure that the victim does not try to rub the eye or grab the object. Extreme care must be taken due to the fact that the eye is very easily damaged. Impairment of vision can result from fumbling and inexpert attempts to remove the foreign object from the eye. **DO NOT UNDER ANY CIRCUMSTANCES ATTEMPT TO REMOVE AN OBJECT THAT IS EMBEDDED IN THE EYEBALL OR THAT HAS PENETRATED THE EYE.** If you see a splinter or other object sticking out from the eyeball, leave it alone! Only specially trained medical personnel can hope to save the victim's sight if an object has actually penetrated the eyeball.

If the foreign object is impaled or stuck into the eyeball, do not try to remove it. However, you must try to protect the eye and make sure that the object does not damage the eye further by following the steps listed below:

1. Take a thick dressing or several dressings and cut a hole in the middle, large enough to go over the eye without touching the object. If you cannot cut a hole in the dressing, you can build up several dressings around the sides of the object.
2. Take a paper cup or any object that is wide enough and tall enough to adequately protect the object without putting pressure on the object. Place this over the top of the object. Cover the uninjured eye with a dressing to minimize movement of the injured eye.
3. Take a roller bandage and wrap it over the cup and around the head several times ensuring that the cup and dressing is snug enough not to come off, but not tight enough to cause discomfort. When finished, this type of dressing will not look like a beautiful masterpiece, but it will adequately protect the eye. NOTE: This is the same procedure to follow if the injury involves the eyeball protruding from the eye socket.

LACERATION OF THE EYELIDS

Soft tissues around the eye bleed very extensively when cut. This bleeding may make the injury look more serious than it actually is; however, the bleeding can be controlled easily with a pressure dressing. As stated earlier, before any pressure is exerted on the eye, make sure that the eyeball is not lacerated (cut). If the eye is lacerated, do not exert pressure on the eye, even to stop bleeding from the eyelid. Pressing on an eye that is lacerated will cause fluid to seep out of the eyeball. This fluid will cause irreparable damage if lost. Also, if the eyelid is lacerated and you find any fragment of skin, save it for the physician by placing it in a wet dressing.

One final note on eye injuries. When you cover the injured eye you must also cover the uninjured eye. The eyes move together, and even when the injured eye is bandaged, it will move when the good eye makes a movement. A dressing over both eyes will cause less movement of the injured eye. When you bandage both eyes, make sure that you tell the victim what is going on and what you are doing, as this will greatly reduce his fears of not being able to see. Ensure that he or she is properly escorted. In addition, obtain medical help for the victim at the earliest opportunity.

HEAD WOUNDS

Injuries to the head can occur as a result of diving, automobile accidents, falling, blunt trauma from a baseball bat, knife, or bullet, and numerous other causes. Head wounds can be open or closed. In open head wounds, there is an obvious injury in which there is usually a lot of bleeding. Closed head wounds may not be obvious, and sometimes you will have to treat the person based on the history of how the accident happened. You may see only the delayed symptoms, such as a seizure, disorientation, or drastic personality change.

In all injuries to the skull, you should check for an injury to the brain. Some signs of possible brain damage could be:

1. Unequal size of pupils (the black round part in the center of the eye).
2. Deformity of the skull.
3. Blood or thick fluid coming from the nose or ears.

In addition to the above, any time there is blunt trauma to the skull, make it a point to keep the victim's neck immobilized, in case there was damage to the spine in the neck area. It is wise to treat for a possible neck injury in order to keep the victim from becoming paralyzed which might happen if the head were moved around during the examination or transportation process.

The emergency care of an individual with a head injury consists of the following:

1. Maintain an open airway.
2. Control the bleeding.
3. Cover skull wounds with sterile dressings.
4. Keep the victim lying down.
5. Give no medications.
6. Administer CPR if necessary.

One important step to remember is not to aggravate the injuries. When controlling bleeding, do not use direct pressure or tie any knots over the wound. In case there is a skull fracture, you do not want to force part of the skull into the brain by using direct pressure. When laying a person down, try to keep the head slightly elevated. If there is an injury to the back of the head or bleeding into the throat and mouth, position the victim on his side so that blood can drain onto the ground and not into his throat. (Try to keep his neck straight.) Also, DO NOT raise the victim's feet when a head injury is present.

FACIAL WOUNDS

Wounds of the face are treated, in general, like other flesh wounds. However, in all facial injuries, ensure that the tongue or injured soft tissue does not block the airway causing a breathing obstruction. Keep the nose and throat clear of any obstructing material, and position the victim so that blood will drain out of the mouth and nose. Remember that facial wounds, as well as scalp wounds, bleed freely. In addition, do not let that scare you from properly treating the victim.

CHEST WOUNDS

All chest injuries must be considered serious conditions, because any chest injury can cause severe breathing and bleeding problems. Any victim showing signs of difficulty in breathing without signs of airway obstruction must be inspected for chest injuries. As with other wounds, chest injuries can be either open or closed. The general signs and symptoms of chest injuries may include pain at the wound or injury site, difficulty breathing, coughing up blood, unequal chest expansion, and a rapid, weak pulse.

Rib Fractures

Fracture of the ribs is not uncommon. These fractures are usually caused by direct blows or compression injuries to the chest. A common finding in all victims with rib fractures, either single or multiple fractures, is pain localized at the site of the fracture. There may or may not be a rib deformity, chest wall contusion, or laceration. Deep breathing, coughing, or movement is usually painful. Often, the victim will attempt to "splint" the area by leaning to the side or holding the injured area. Simple rib fractures usually do not require any external support or splinting, but the patient may be more comfortable in a sling and swathe as shown in figure 5-3.

Occasionally, a condition known as flail chest occurs. This is when three or more ribs are broken, each in two or more places. Flail chest is also known by the term crushed chest. Usually,

Figure 5-3.—Swathe bandaging of fractured rib victim.

considerable pain is associated with this injury. A flail chest injury is serious; the area between the fractures moves opposite the direction of the rest of the chest during ventilation decreasing the efficiency of ventilation. With the associated pain, the victim will also breathe shallowly further decreasing ventilation efficiency. The generalized treatment for a flail chest is to provide external support to the fractured area such as the surface of a litter or holding a pillow firmly over the area of injury.

Penetrating Injuries

Any injury that penetrates the chest wall is considered an open wound. Common examples of this are stab wounds and gunshot wounds. Gunshot wounds often have entrance and exit wounds. Normally, these types of injuries will damage internal organs in the chest i.e., the lungs, major blood vessels, or the heart. If the major blood vessels are damaged, massive rapid blood loss occurs resulting in severe shock. If the lungs are damaged, breathing is compromised. As with other penetrating wounds, do not attempt to remove impaled objects; stabilize the object and place a dressing around it.

Included under the heading of penetrating wounds is the sucking chest wound, so named because of the action and sound of the wound. As the victim inhales, air is sucked into the chest cavity through the wound and may make a sucking sound. As air enters the chest cavity, the lung collapses. Rapid treatment must be initiated if the victim is to survive.

As an initial emergency treatment, it is imperative that sucking chest wounds be sealed with an airtight dressing. The purpose of the airtight dressing is to seal the wound so that air can no longer enter the chest cavity through the wound. Any material that is airtight, such as aluminum foil, cellophane, or an ID card, if it is large enough, can be used to seal the wound. The seal should be secured with tape to prevent air from entering under the seal. If respiratory difficulty becomes more profound soon after you apply the airtight dressing, it may be as a result of air trapped in the chest cavity. This condition can be relieved if you quickly remove the airtight dressing and then replace it but securing it to the chest wall on only three sides. Place a dressing over the area to protect the airtight seal and to add to the victim's comfort.

After the wound is sealed and dressed, place the victim on his wounded side unless there are back injuries. Placing the victim on the wounded side will keep the good lung up so that breathing will be easier. If the victim is having difficulty breathing while on the wounded side, you can place him in a semi-sitting position. Observe the victim closely for signs of respiratory distress or shock and treat accordingly. Transport the victim to a medical treatment facility immediately.

ABDOMINAL WOUNDS

A deep wound in the abdomen is likely to constitute a major emergency because there are many vital organs in this area. Abdominal wounds usually cause intense pain, nausea and vomiting, spasms of the abdominal muscles, and severe shock. If the abdominal wound is an open or penetrating wound, the only certain way to determine if organs have been injured is for a physician to perform an operation and look at each organ. Every abdominal wound is based on the assumption that internal organs have been damaged and therefore immediate surgical treatment is required. The victim must receive medical attention at once, or the chances of survival will be very poor. Give only the most essential first aid treatment, and direct your efforts toward getting the victim to a medical facility.

Closed Abdominal Injuries

Blunt or closed abdominal wounds are those caused by a severe blow but where the abdominal wall remains intact. Death is usually caused by blood loss into the abdominal cavity, so treatment should be limited to treating for shock and transporting the victim to a medical treatment facility as soon as possible. A secondary complication of blunt trauma is the development of a condition known as peritonitis; the lining of the abdominal cavity becomes inflamed, irritated, or infected. This condition is not normally seen immediately after an injury, but develops later and can be fatal. It is usually the result of a rupture of the intestines or a penetration into the abdominal cavity from the outside; it can also be the result of appendicitis. Once peritonitis develops, medical and/or surgical intervention is required if the patient is to survive.

Open Abdominal Wounds

Any abdominal injury where the skin is broken is considered an open wound. Gunshot

wounds and stabbings are classic examples of open abdominal wounds. A special problem exists in that, without an operation, it is virtually impossible to determine if an object or missile has actually penetrated the abdominal cavity. Because of this unknown, you must assume that major damage has occurred even if signs are not immediately present. Extensive lacerations of the abdominal wall may allow some of the organs to protrude, a condition known as evisceration. Evisceration injuries are first priority emergencies and should be attended to immediately after airway, breathing and circulation (discussed previously).

Treatment for abdominal wounds consists of dressing the wounds and treating for shock. If abdominal organs are not protruding, cover the wound with a dry sterile dressing. If organs are protruding, **DO NOT** attempt to replace them within the abdomen. See figure 5-4. Apply a sterile compress moistened with sterile water. Do not use any material that clings or loses its substance when wet, such as paper towels, cotton bunting, or toilet paper. If no sterile water is available, use clean sea water, or any water that is fit to drink to moisten the compress. Covering the organs and keeping them warm and moist is of utmost importance. The compress should be large enough to cover the wound and surrounding areas. Hold the compress in place with a bandage; large battle dressings are ideal. Fasten the bandage firmly, so that the compress will not slip around, but do not apply any more pressure than is necessary to hold the bandage in place.

DRESSINGS

In general, the term **DRESSING** is used to describe anything that is used to cover or dress a wound. The sterile pad that is put directly over the wound is called a **COMPRESS. A BANDAGE** is used to hold the compress in position.

A combined compress and bandage, in which the sterile gauze pad is fastened to a gauze, muslin, or adhesive bandage, is usually referred to as a dressing. Most Navy first aid kits contain large, medium, and small dressings of this kind.

When applying a dressing, you must ensure that the dressing is kept as sterile as possible. The part of the dressing that touches the wound must **NEVER** touch your fingers, clothing, or any unsterile object. If you drag a dressing across the victim's skin or allow it to slip after it is in place, the dressing is no longer sterile.

BATTLE DRESSINGS

Battle dressings are commonly used aboard ship and at some naval activities. Battle dressings

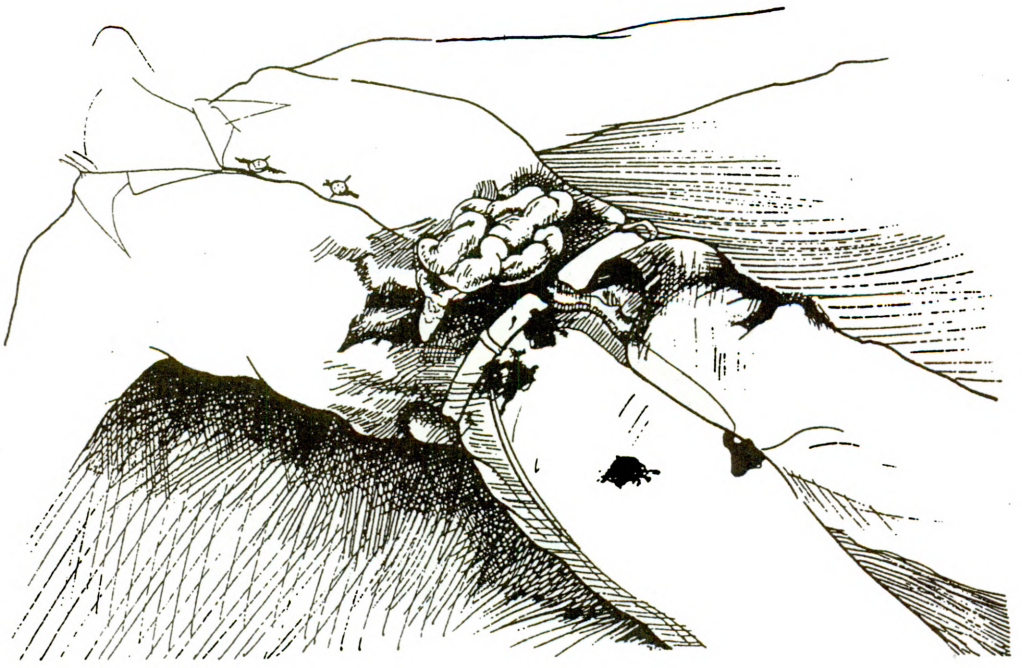


Figure 5-4.—Abdominal wound with protruding intestine.

are supplied in three sizes; large, medium, and small. Each dressing is complete (no other materials are needed) and has four tails which are very helpful in applying and securing the dressing. The dressings have "**OTHER SIDE NEXT TO WOUND**" marked on the outer side of them. This will aid you in making sure that the sterile side is placed on the wound. See figure 5-5. Unless otherwise specified, tie the knot of the dressing over the wound to assist in controlling the bleeding.

COMPRESSES

Emergencies sometimes arise in which it is impossible to obtain a regular sterile compress. In such a situation, use the cleanest cloth available. A freshly laundered handkerchief, towel, or shirt may be used. Unfold the material carefully so that you do not touch the part that goes next to the wound.

A compress should be large enough to cover the entire area of the wound and to extend at least 1 inch in every direction beyond the edges. If the compress is not large enough, the edges of the wound are almost sure to become contaminated.

Materials that are likely to stick to a wound or that may be difficult to remove should **NEVER** be used directly over a wound. Absorbent cotton, adhesive tape, electrician's tape, and friction tape are examples of materials that should **NOT** come in direct contact with a wound.

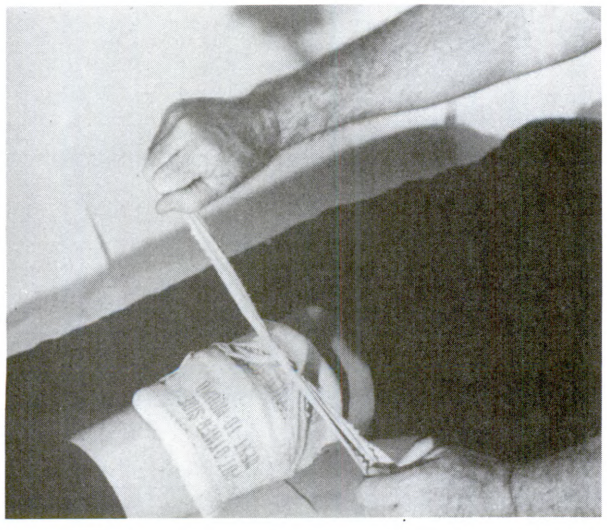


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Figure 5-5.—Battle dressing.

BANDAGES

Bandages are used to hold compresses that are applied to the surface of the body, to help secure splints, to create pressure, and to immobilize joints. It is not necessary to take time to ensure that the bandage you are putting on resembles the textbook pictures of bandaging. However, it is important that the dressing does what it is supposed to do: stop the bleeding, prevent further contamination, and prevent further movement or injury to the wound. Some of the more commonly used bandages are the **ROLLER BANDAGE**, and the **TRIANGULAR BANDAGE.**

Roller Bandages

Roller bandages, as shown in figure 5-6, consist of long strips of material (usually gauze or muslin) that are rolled into a cylindrical shape. Roller bandages come in various widths and lengths. Most of the roller bandages found in first aid kits have been sterilized, so pieces may be cut off and used as compresses in direct contact with the wounds. If you use a piece of roller bandage in this manner, be very careful not to touch it with your hands or with any other unsterile object.

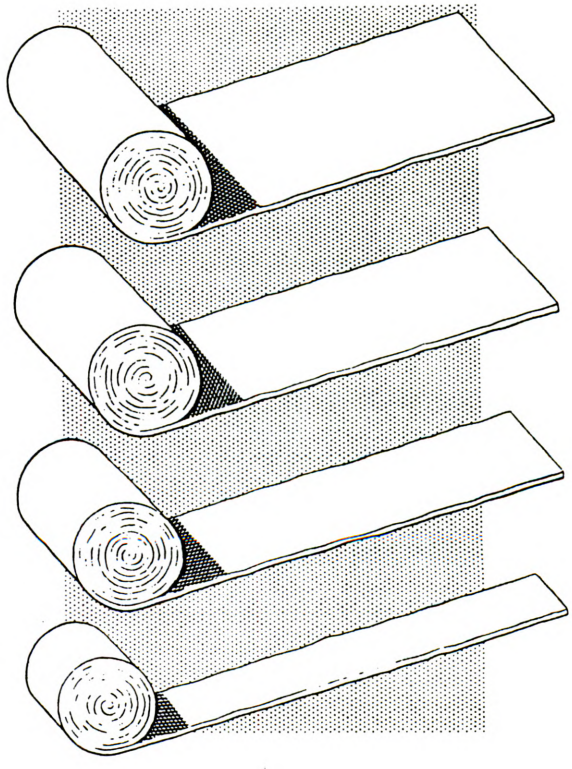


Figure 5-6.—Roller bandages.

A piece of roller bandage may be used to make a **FOUR-TAILED BANDAGE.** This is done by splitting the cloth from each end, leaving as large a center as necessary. Figure 5-7A depicts a bandage of this kind. The four-tailed bandage is often used to hold a compress on the chin, as shown in figure 5-7B, or on the nose, as shown in figure 5-7C. It is particularly good for bandaging any protruding part of the body, because the center of the bandage forms a smooth-fitting pocket when the tails are crossed over.

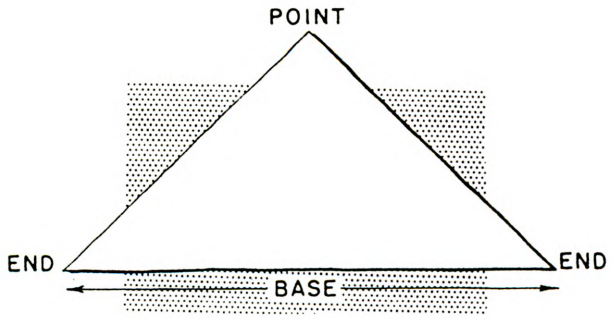


Figure 5-8.—Triangular bandage.

Triangular Bandages

Triangular bandages are usually made of muslin. They are made by cutting a 36- to 40-inch square from a piece of cloth, and then by cutting the square diagonally. A smaller bandage of this kind may be made by folding a large handkerchief diagonally. The longest side of the triangular bandage is called the **BASE;** the corner directly opposite is called the **POINT;** and the other two corners are called the **ENDS.** Figure 5-8 illustrates a triangular bandage with the base, points, and ends labeled. The triangular bandage is useful because it can be folded in a variety of ways to fit almost any part of the body. In addition, many first aid kits have triangular bandages already fabricated.

The triangular bandage may be folded to form a **CRAVAT BANDAGE,** which is especially useful in controlling bleeding from wounds of the scalp or forehead. To make the cravat, bring the point of the triangular bandage down to the base; then fold the bandage lengthwise along the middle. The cravat may then be used, or if a narrower bandage is desired, it may be folded again along the middle. Figure 5-9 shows you how to fold a triangular bandage into a cravat.

If specially prepared bandages are not available, use whatever material you can find. Remember that the basic purpose of a bandage

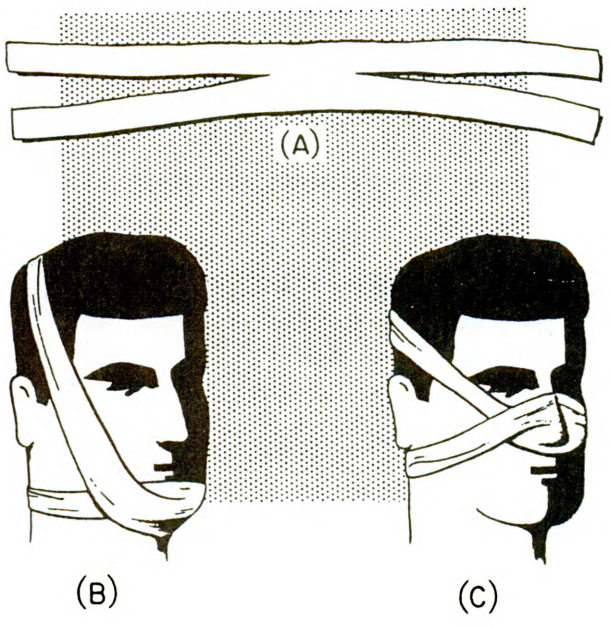


Figure 5-7.—Four-tailed bandage.

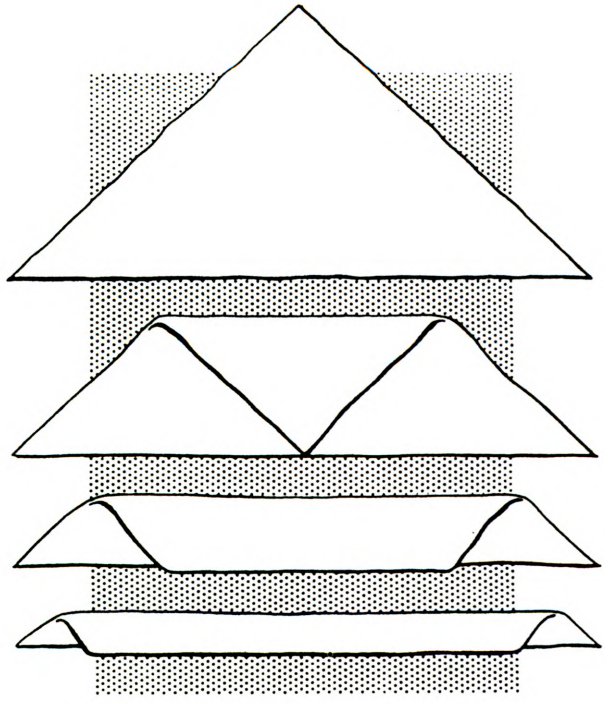


Figure 5-9.—Cravat bandage.

is to hold the sterile compress in place. Any material or any method of application that does not cause further injury to the victim will be adequate if it serves the purpose. Material used as a bandage does not have to be sterile, since it will not come in direct contact with the wound. However, it should be as clean as possible.

Cloth bandages should be fastened by tying the ends with a **SQUARE KNOT** or by pinning the ends with strong safety pins. If you use a knot to fasten the bandage, be sure to use a square knot. This knot is easy to tie, will not slip, and can be untied quickly when necessary. Also make sure that you place the knot so it will cause the least possible discomfort to the victim, and that you place it where it can be removed easily and quickly.

As a general rule, bandages should be applied firmly but not too tightly. A bandage that is too loose is likely to slip off the wound. A bandage that is too tight may cut off some of the blood supply to the injured part and may cause severe damage to the blood vessels and tissues. When you fasten a bandage around an arm or leg, leave the fingers or toes exposed. If they become blue or swollen, you will know that the bandage is too tight and should be loosened. Figures 5-10 through 5-15 illustrate some of the many uses of the triangular, roller, and the cravat bandage.

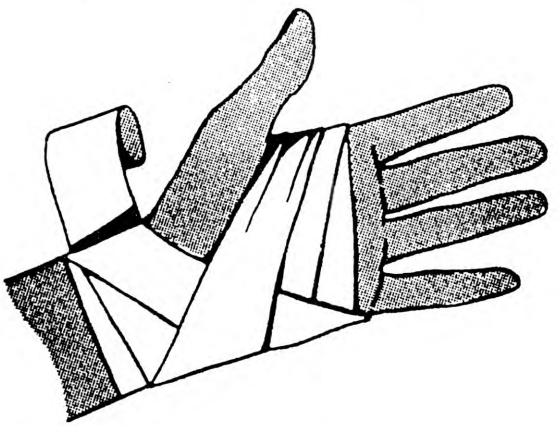


Figure 5-10.—Roller bandage for the hand and wrist.

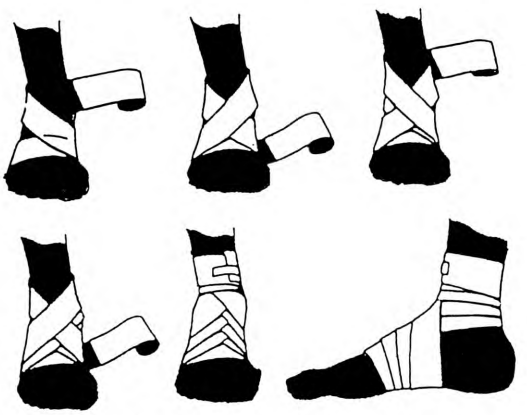


Figure 5-11.—Roller bandage for the ankle and foot.

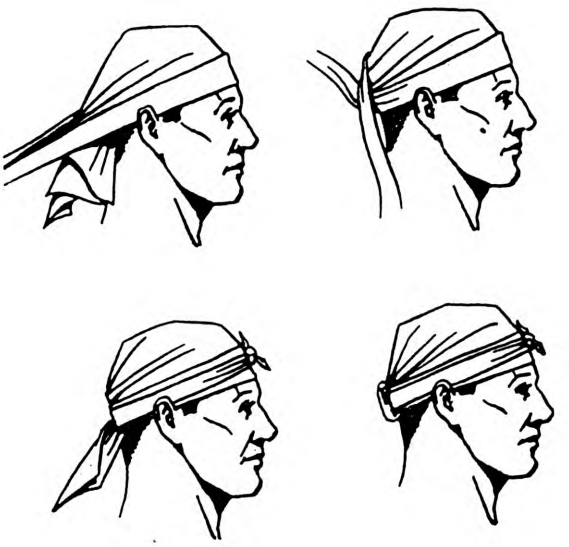


Figure 5-12.—Triangular bandage for the head.

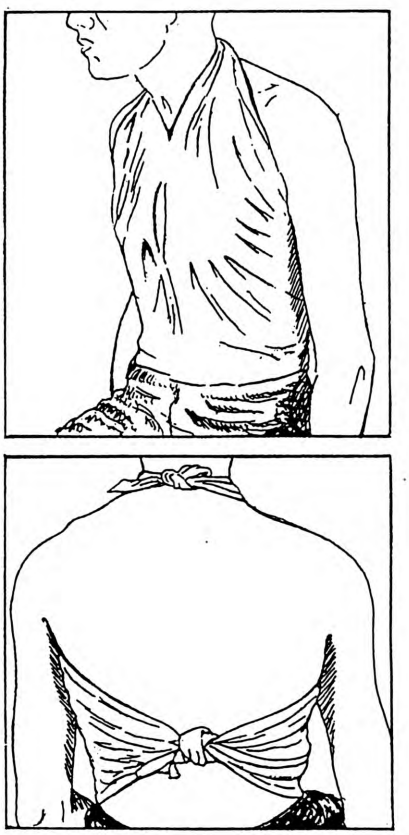


Figure 5-13.—Triangular bandage for the chest.

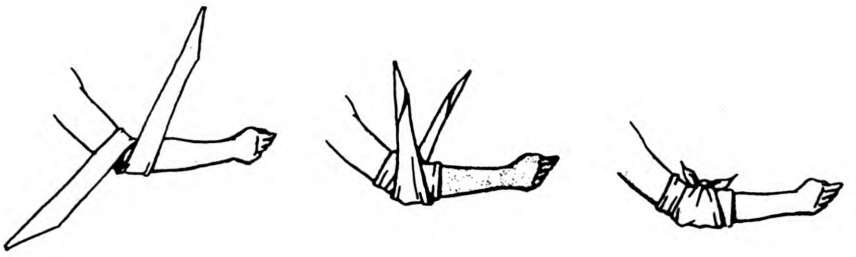


Figure 5-14.—Cravat bandage for the elbow or knee.

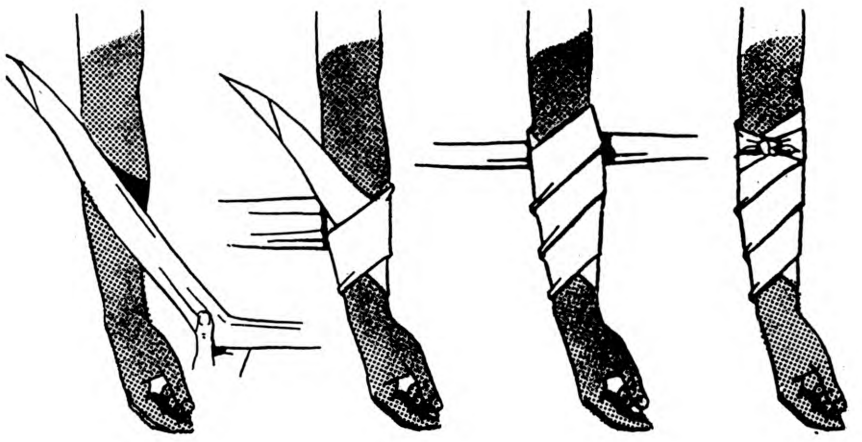


Figure 5-15.—Cravat bandage for the arm, forearm, leg, or thigh.

STANDARD FIRST AID KITS

Nonmedical personnel are an important factor in the first aid treatment of casualties prior to the arrival of medical help. Many lives have been saved by the first aid treatment rendered by a shipmate. Standard Navy first aid kits are distributed throughout a ship to provide an easy access to first aid equipment. These first aid kits are a part of a ship's required equipment. The number of first aid kits available depends on the size of the ship's crew and the function of the ship.

Various dressings, wire splints, tapes, band-aids, tourniquets, skin pencils, and many other needed first aid supplies are included in these kits. Each kit has a wire seal on the outside. The wire seals are not meant to keep you out of the kit but are used to determine whether the kit has been opened. A broken seal indicates that the first aid kit must be inventoried and restocked, if needed.

The standard first aid kit has three compartments. Each compartment should have a plastic bag that is complete with the essential first aid supplies. Take one of these complete bags enroute to an injured person. Failure to take a complete bag to the scene of the injured person may result in you having to go back for supplies. The kit does not contain any needles, syringes, or drugs; but it does have just about everything that you will need to render proper first aid to a victim. It is important that you do not use the standard first aid bag to obtain items for your own personal first aid kit. During your tour with the Navy, you may find many variations in these first aid kits. It is important that you get to know the locations and contents of these kits.

CHAPTER 6

INJURIES TO BONES, JOINTS, AND MUSCLES

Many kinds of accidents cause injuries to the bones, joints and muscles. In giving first aid to an injured person, you must always look for signs of fractures (broken bones), dislocations, sprains, strains, and contusions (bruises).

An essential part of first aid treatment for fractures consists of immobilizing the injured part with splints so that the sharp ends of broken bones will not move around and cause further damage to the nerves, blood vessels, or vital organs. Splints are also used to immobilize severely injured joints or muscles and to prevent the enlargement of extensive wounds. You must have a general understanding of the use of splints before going on to learn detailed first aid treatment for injuries to the bones, joints, and muscles.

USE OF SPLINTS

In an emergency, almost any firm object or material will serve as a splint. Thus, umbrellas, canes, swords, rifles, sticks, oars, boards, pillows, and folded newspapers, among other objects, can be used as splints. A fractured leg may sometimes be splinted by fastening it securely to the uninjured leg.

Splints, whether ready-made or improvised, must fulfill certain requirements. They should be lightweight, strong, fairly rigid, and long enough to reach the joints above and below the fracture. Splints should be wide enough so that the bandages used to hold them in place will not pinch the injured part. Splints must be well-padded on the sides touching the body. If they are not properly padded, they will not fit well and will not adequately immobilize the injured part. If you must improvise the padding for a splint, you may use articles of clothing, bandages, cotton blankets, or any other soft material. If the victim is wearing heavy clothes, you may be able to apply the splint on the outside, thus allowing the clothing to serve as at least part of the required padding.

To apply splints to an injured part, fasten them in place with bandages, strips of adhesive tape, articles of clothing, or any other available material. If possible, one person should hold the splints in position while another person fastens them.

Although splints should be applied snugly, they should **NEVER** be so tight as to interfere with the circulation of blood. When you are applying splints to an arm or leg, try to leave the fingers or toes exposed. If the tips of the fingers or toes become blue or cold, you will know that the splints or bandages are too tight. You should examine a splinted part approximately every half hour, and loosen the fastening if the circulation appears to be impaired. Remember that any injured part is likely to swell, and splints or bandages that are applied correctly may later become too tight.

INJURIES TO BONES

A break in a bone is called a FRACTURE. There are two main kinds of fractures: closed and open. A closed fractured is one in which the injury is entirely internal; an open fracture is one in which there is an open wound in the tissues and skin. An open fracture is also referred to as a compound fracture. Sometimes the open wound is made when a sharp end of the broken bone pushes out through the flesh; sometimes it is made by an object such as a bullet that penetrates from the outside. Figure 6-1 shows closed and open fractures.

Open fractures are normally far more serious than closed fractures. They usually involve extensive tissue damage and are likely to become infected. Closed fractures are sometimes converted into open fractures by rough or careless handling. Therefore, **ALWAYS USE EXTREME CARE AND CAUTION WHEN TREATING A SUSPECTED FRACTURE.**

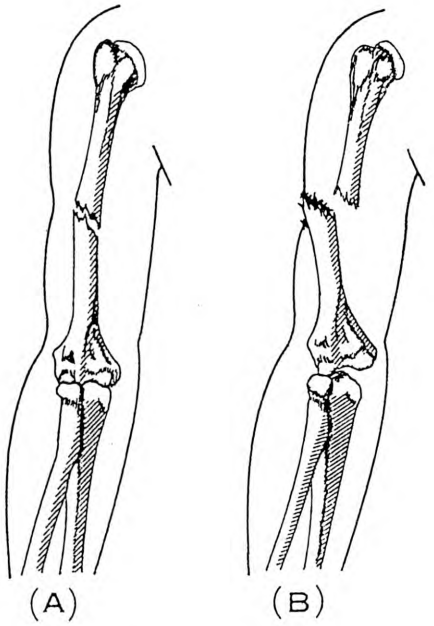


Figure 6-1.—Types of fractures.

It is not always easy to recognize a fracture. All fractures, whether closed or open, are likely to cause severe pain or shock, but other symptoms may vary considerably. A broken bone sometimes causes the injured part to become deformed, or to assume an unnatural position; it may be angulated or rotated, or it may be shortened. Compare the injured extremity or part to the uninjured part on the opposite side to help you determine whether a deformity exists. The opposite side provides a mirror image for comparison. Pain and swelling may be localized at the fracture site, and there may be a wobbly movement if the bone is broken clear through. It may be difficult or impossible for the victim to move the injured part. If movement is possible, the victim may feel a grating sensation as the ends of the broken bones rub against each other. However, if a bone is cracked rather than broken through, the victim may be able to move the injured part without much difficulty. An open fracture is easy to recognize if an end of the broken bone protrudes through the flesh. If the bone does not protrude, you might see the external wound but fail to recognize the broken bone.

If you are required to give first aid to a person who has suffered a fracture, follow these general rules:

1. If there is any possibility that a fracture has been sustained, treat the injury as a fracture.

2. Get the victim to a medical treatment facility at the first opportunity. All fractures require medical treatment.

3. Do not move the victim until the injured part has been splinted, unless you must move out of a life-threatening environment to prevent further injury.

4. Treat for shock.

5. Do not attempt to locate a fracture by grating the ends of the bone together.

6. Do not attempt to set a broken bone.

7. When a long bone in the arm or leg is fractured, the limb should be carefully straightened so that splints can be applied. Never straighten a limb by applying force or traction. Pulling gently with your hands in the direction of the long axis of the limb is permissible and may be all that is necessary to get the limb back into position.

8. Apply a splint. If the victim must be transported for some distance, or a considerable period of time will elapse before treatment by a medical officer, it may be better to remove enough of the victim's clothing so that you can apply well-padded splints directly to the injured part. However, if the victim is to be transported only a short distance, or if treatment by a medical officer will not be delayed, it is probably best to leave the clothing on and apply emergency splinting over it. If you decide to remove the clothing over the injured part, extreme care must be taken. Cut away the clothing or rip it along the seams. Remember, rough handling of the victim may convert a closed fracture into an open fracture, increase the severity of shock, and cause extensive damage to blood vessels, nerves, muscles, and other tissues around the broken bone.

9. If the fracture is open, you must take care of the wound before you can treat the fracture. Bleeding from the wound may be quite serious; however, most bleeding can be stopped by applying direct pressure on the wound or by applying digital pressure at the appropriate pressure point. If these methods are not successful, use a tourniquet. (Methods of stopping serious bleeding are described in Chapter 3.) When you have stopped the bleeding, give further treatment as necessary for the wound, according to the principles discussed in Chapter 5. Then treat the fracture.

Now that we have examined the general rules for treating fractures, let us discuss the symptoms and emergency treatment for specific fractures.

FRACTURE OF THE FOREARM

There are two large bones in the forearm. When both are broken, the arm usually appears to be deformed. When only one bone is broken, the other acts as a splint and the arm therefore retains a more or less natural appearance. Any fracture of the forearm is likely to result in pain, tenderness, an inability to use the forearm, and a wobbly motion at the point of injury. If the fracture is open, there will be an open wound through which the bone may show.

In treating a fracture of the forearm, follow the general rules above. If the fracture is open, control the bleeding and treat the open wound. Carefully straighten the forearm. (Remember that rough handling can convert a closed fracture into an open one.) Apply two well-padded splints to the forearm; one on the top (backhand side), and one on the bottom (palm side). Make sure the splints are long enough to extend from the elbow to the wrist. Use bandages to hold the splints in place.

Once the forearm is splinted, put the forearm across the chest. The palm of the hand should be turned in, with the thumb pointing upward. Support the forearm in this position by means of a wide sling, as shown in figure 6-2. The hand should be raised about 4 inches above the level of the elbow.

As in all cases of fractures, treat the victim for shock and obtain medical attention as soon as possible.

FRACTURE OF THE UPPER ARM

The signs of fracture in the upper arm include pain, tenderness, swelling, and a wobbly motion at the point of fracture. If the fracture is near the elbow, the arm is likely to be straight with no bend at the elbow.

First aid treatment for a fracture of the upper arm is dependent on where the fracture is located, that is, whether the fracture is in the upper part of the arm, the middle of the arm, or near the elbow.

If the fracture is in the upper part of the arm, near the shoulder, place a pad or folded towel in the armpit, bandage the arm securely to the body, and support the forearm in a narrow sling.

If the fracture is in the middle of the upper arm, you may use one well-padded splint on the outside of the arm. The splint should extend from the shoulder to the elbow. Fasten the splinted arm firmly to the body, and support the forearm in a narrow sling, as depicted in figure 6-3.

Another method the treating a fracture in the middle of the upper arm is to fasten two wide splints, or four narrow ones, around the arm, and support the forearm in a narrow sling. If you use a splint between the arm and body, ensure that it does not extend too far up into the armpit. A splint in this position can cause a dangerous compression of the blood vessels and nerves and may be extremely painful to the victim.

If the fracture is at or near the elbow, the arm may be either bent or straight. Regardless of the

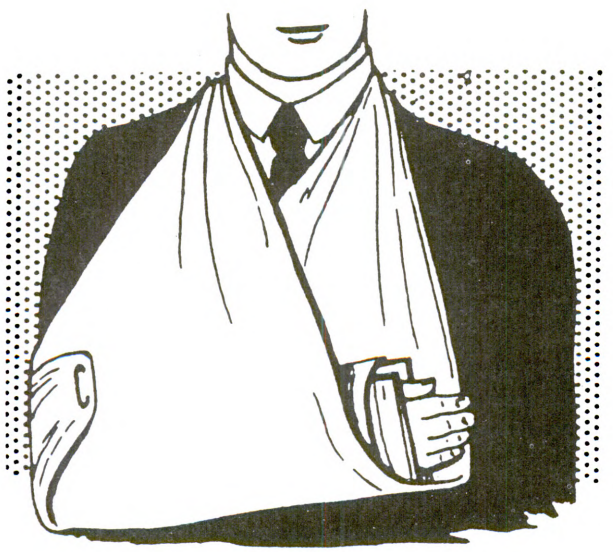


Figure 6-2.—Sling used to support a fractured forearm.

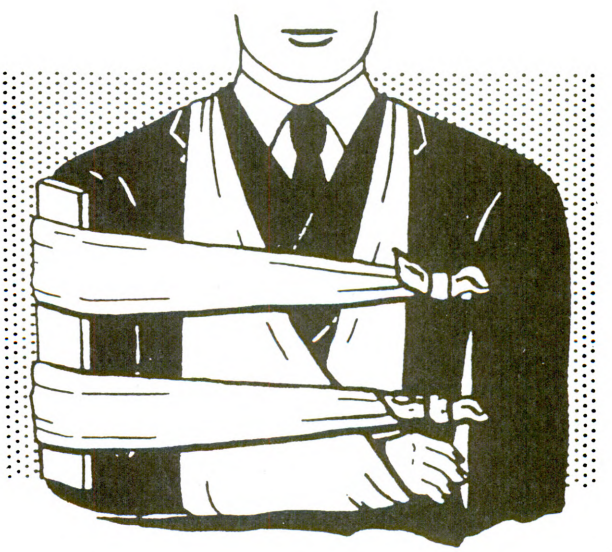


Figure 6-3.—Splint and sling for a fractured upper arm.

position you find the arm in, **DO NOT ATTEMPT TO STRAIGHTEN IT OR MOVE IT IN ANY WAY**. As carefully as possible, splint the arm in the position in which you find it.

Treat the victim for shock, and obtain medical care as soon as possible.

FRACTURE OF THE THIGH

The thighbone is the long bone in the upper part of the leg, between the kneecap and the pelvis. When the thighbone is fractured, any attempt to move the limb results in a spasm of the muscles and causes excruciating pain. The leg has a wobbly motion, and there is complete loss of control below the fracture. The limb usually assumes an unnatural position, with the toes pointing outward. By actual measurement, the fractured leg is shorter than the uninjured one, due to the pull of the powerful thigh muscles. Serious damage to the blood vessels and nerves often results from a fracture of the thighbone. Shock is likely to be severe.

If the fracture is open, stop the bleeding and treat the wound before attempting to treat the fracture itself. Serious bleeding is a special danger in this type of injury, since the broken bone may tear or cut the large artery in the thigh.

Carefully straighten the leg. Apply two splints, one on the outside of the injured leg and one on the inside. The outside splint should reach from the armpit to the foot, the inside splint from the groin to the foot. The splint should be fastened in five places: (1) around the ankle, (2) over the knee, (3) just below the hip, (4) around the pelvis, and (5) just below the armpit. Both legs should be tied together to provide further support to the injured leg.

It is essential that a fractured thigh be splinted before the victim is moved. Ready made splints are best, but improvised splints may be used. Figure 6-4 illustrates how boards may be used as an emergency splint for a fractured thigh. Remember, **DO NOT MOVE THE VICTIM UNTIL THE INJURED LEG HAS BEEN IMMOBILIZED.**

Treat the victim for shock, and get medical care at the earliest opportunity.

FRACTURE OF THE LOWER LEG

When both bones of the lower leg are broken, the usual signs of fractures are likely present. When only one bone is broken, the other one acts as a splint and to some extent prevents deformity of the leg. However, tenderness, swelling, and pain at the point of the fracture are usually present. A fracture just above the ankle is often mistaken for a sprain. If both bones of the lower leg are broken, an open fracture is likely to result.

If the fracture is open, stop the bleeding and treat the wound. Carefully straighten the leg. Apply three splints, one on each side of the leg and one underneath. Ensure that the splints are well-padded, especially under the knee and at the bones on each side of the ankle.

A pillow and two side splints work well for treatment of a fractured lower leg. Place the pillow beside the injured leg, then carefully lift the leg and place it in the middle of the pillow. Bring the edges of the pillow around to the front of the leg and pin them together. Then place one splint on each side of the leg, over the pillow, and fasten them in place with strips of bandage or adhesive tape.

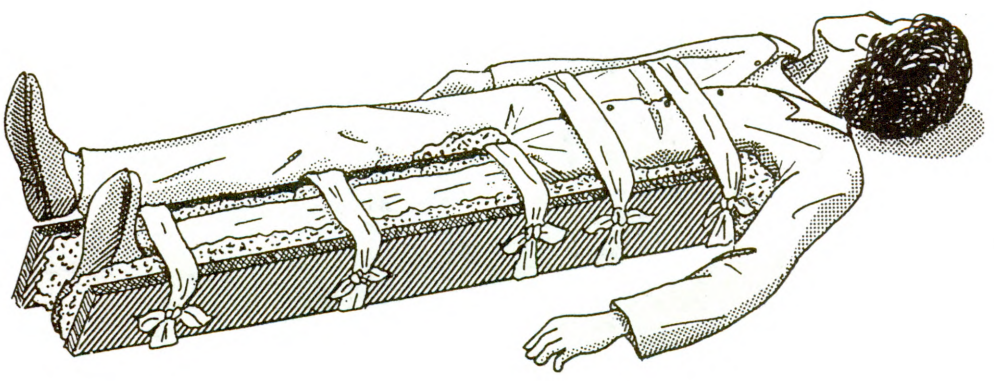


Figure 6-4.—Boards used as emergency splint for fractured thigh.

Treat the victim for shock, and obtain medical care as soon as possible.

FRACTURE OF THE KNEECAP

Although fractures of the kneecap can and do occur, the more common injuries are dislocations and ligament injuries. In any event, the treatment is essentially the same. Carefully straighten the injured leg. Immobilize the injury by placing a padded board under the injured leg. The board should be at least 4 inches wide and should reach from the buttock to the heel. Place extra padding under the knee and just above the heel, as shown in figure 6-5. Use strips of bandage to fasten the leg to the board in four places; (1) just below the knee, (2) just above the knee, (3) at the ankle, and (4) at the thigh. **DO NOT COVER THE KNEE ITSELF**. Swelling is likely to occur rapidly and any bandage or tie fastened over the knee would quickly become too tight.

FRACTURE OF THE COLLARBONE

A person with a fractured collarbone usually shows definitive symptoms. When the victim stands, the injured shoulder is lower than the uninjured one. Usually, the victim is unable to raise his arm above the level of his shoulder. The injured person may attempt to support the injured shoulder by holding the elbow of that side in his other hand. This is a characteristic posture assumed by a person with a broken collarbone. Since the collarbone lies near the surface of the skin, you may be able to detect the point of fracture by the deformity and the localized pain and tenderness.

If the fracture is open, stop the flow of blood and treat the wound before attempting to treat the fracture. You must bend the victim's arm on his injured side, and place his forearm across the chest. The palm of his hand should be turned in, with the thumb pointing up. The hand should be raised about 4 inches above the level of the elbow. Support the forearm in this position by means of a wide sling.

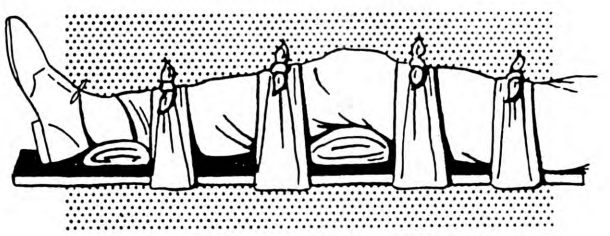


Figure 6-5.—Immobilization of fractured kneecap.

Next, use a wide roller bandage (or any wide strip of cloth) to fasten the victim's arm to his body. Wrap the bandage several times around the victim's body, and ensure that it goes down over the hand so that the arm will be held close against the body.

Treat the victim for shock, and obtain medical attention at the earliest opportunity.

FRACTURE OF THE NOSE

A fracture of the nose usually causes localized pain and swelling, a noticeable deformity of the nose, and extensive nosebleed. First, stop the nosebleed. Have the victim sit quietly, with the head tipped slightly backward. Instruct the patient to breathe through his mouth not his nose. If the bleeding does not stop within a few minutes, apply a cold compress or ice bag over the nose.

Treat the victim for shock, and obtain medical help as soon as possible. A permanent deformity may result if the fracture is not treated promptly.

FRACTURE OF THE JAW

A person who has a fractured jaw may suffer a serious interference with breathing. The victim is likely to have great difficulty in talking, chewing, or swallowing. Any movement of the jaw causes pain. The teeth may be out of line, and there may be bleeding from the gums. Considerable swelling may develop.

One of the most important phases of emergency care is to clear the upper respiratory passage of any obstruction. If the fractured jaw interferes with breathing, pull the lower jaw and tongue **FORWARD** and keep them in that position.

Apply a four-tailed bandage, as shown in figure 6-6. Be sure that the bandage pulls the lower

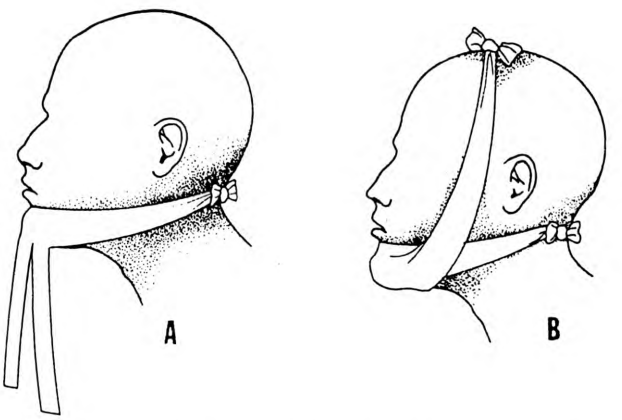


Figure 6-6.—Four-tailed bandage for a fractured jaw.

jaw **FORWARD**. Never apply any bandage that forces the jaw backward, since this might seriously interfere with breathing. The bandage must be firm in order to support the jaw properly, but it must not press against the victim's throat. Ensure that the victim has scissors or a knife to cut the bandage in the event vomiting occurs.

Treat the victim for shock and obtain medical attention as soon as possible.

FRACTURE OF THE SKULL

When a person suffers a head injury, the greatest danger is that the brain may be severely damaged. Whether or not the skull is fractured is a matter of secondary importance. In some cases, injuries that fracture the skull do not cause serious brain damage. But brain damage can, and frequently does, result from apparently slight injuries that do not cause damage to the skull itself.

It is often difficult to determine whether an injury has affected the brain, because symptoms of brain damage vary greatly. Any person who has suffered a head injury of any kind must be handled carefully and given immediate medical attention.

Some of the symptoms that may indicate brain damage are listed below. However, you must remember that these symptoms are not always present in any one case, and that the symptoms that do occur may be greatly delayed.

1. Bruises or wounds of the scalp may indicate that the victim has sustained a blow to the head. Sometimes the skull is actually depressed at the point of impact. If the fracture is open, you may find bullets, grass, shrapnel, or other objects penetrating the skull.
2. The victim may be conscious or unconscious. If conscious, the victim may feel dizzy and weak, as though he were going to faint.
3. Severe headache sometimes, but not always, accompanies head injuries.
4. The pupils of the eyes may be unequal in size and may not react normally to light.
5. There may be bleeding from the ears, nose, or mouth.
6. The victim may vomit.
7. The victim may be restless and perhaps confused and disoriented.
8. The arms, legs, face, or other parts of the body may be partially paralyzed.
9. The victim's face may be very pale, or it may be unusually flushed.
10. The victim is likely to be suffering from shock, but the symptoms of shock may be disguised by other symptoms.

It is not necessary to determine whether or not the skull is actually fractured when you are giving first aid to a person who has suffered a head injury. The treatment is the same in either case, and the primary intent is to prevent further damage to the brain.

Keep the injured person lying down. If facial flushing is apparent, raise the victim's head and shoulders slightly. If facial pallor (paleness) is present, position the victim so that the head is level with or slightly lower than the body. Watch carefully for vomiting. If the victim begins to vomit, position the head so that choking on the vomitus does not occur.

If there is serious bleeding from the wounds, try to control it by applying direct pressure, using caution to avoid further injury to the skull or brain.

You must exercise care when moving or handling the victim. Transport the person only when necessary. If you must transport, keep the victim lying down.

Be sure that the victim is kept comfortably warm but do not overheat him. **DO NOT GIVE THE VICTIM ANYTHING TO EAT OR DRINK. DO NOT GIVE ANY MEDICATION.**

Finally, obtain medical attention for the victim as soon as possible.

FRACTURE OF THE SPINE

The spinal cord, which contains nerve fibers in direct connection with the brain, is enclosed and protected by a bony structure known as the **SPINAL COLUMN**, or **BACKBONE**. The spinal column is made up of a number of small bones called the **VERTEBRAE**.

If the spine is fractured at any point, the spinal cord may be crushed, cut, or otherwise damaged so severely that death or paralysis will result. However, if the fracture occurs in such a way that the spinal cord is not seriously damaged, there is a good chance of complete recovery, **PROVIDED, THE VICTIM RECEIVES PROPER CARE**. Any twisting or bending of the neck or back, whether due to the original injury or caused by careless handling, is likely to cause irreparable damage to the spinal cord.

The primary symptoms of a fractured spine are pain, shock, and paralysis. **PAIN** is likely to be acute at the point of fracture. It may radiate

to other parts of the body. **SHOCK** is usually severe, but (as in all injuries) the symptoms may be delayed for some time. **PARALYSIS** occurs if the spinal cord is seriously damaged. If the victim is unable to move the legs, feet, or toes, the fracture is probably in the back. If he cannot move the fingers, the neck is probably broken. Remember, however, that a spinal fracture does not always injure the spinal cord, so the victim is not always paralyzed. Any person who has acute pain in the back or neck, following an injury, should be treated as though a fracture of the spine has occurred. This remains true even though no other symptoms are present.

First aid for all spinal fractures, whether of the neck or back, has two primary purposes: (1) to minimize shock, and (2) to prevent further injury to the spinal cord.

You must keep the victim comfortably warm. **DO NOT** attempt to place the victim in the position normally used to treat shock. Any unnecessary movement may cause further injury to the spinal cord. Keep the victim lying flat. **DO NOT** attempt to lower the victim's head.

To avoid further damage to the spinal cord, **DO NOT MOVE THE VICTIM UNLESS IT IS ABSOLUTELY ESSENTIAL.** But if you must transport, **DO NOT BEND OR TWIST THE VICTIM'S BODY; DO NOT MOVE THE HEAD FORWARD, BACKWARD, OR TO EITHER SIDE; AND DO NOT, UNDER ANY CIRCUMSTANCES, ALLOW THE VICTIM TO SIT UP.**

If it is necessary to transport a person who has suffered a fracture of the spine, follow these general rules:

1. If the spine is broken at the **NECK**, the victim must be transported lying flat on his back with the face up. Place pillows or sandbags beside the head so that it cannot turn to either side. **DO NOT PUT PILLOWS OR PADDING UNDER THE NECK OR HEAD.**

2. If you suspect the spine is fractured, but do not know the location of the break, treat the injury as though the victim has a broken neck. In other words, the victim should be lying on his back, with the face up. If both the neck and back are broken, treat the victim in the same manner.

3. No matter where the spine is broken, **USE A FIRM SUPPORT IN TRANSPORTING THE VICTIM.** Use a rigid stretcher, or use a door, shutter, wide board, or a frame similar to that shown in figure 6-7. Pad the support carefully, and put blankets both under and over the victim.

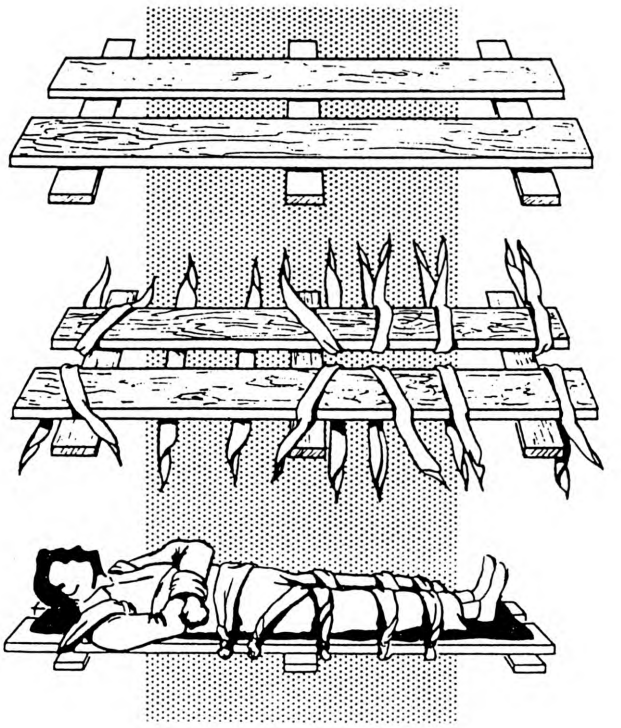


Figure 6-7.—Improvised frame for transporting victim with fractured spine.

Use cravat bandages or strips of cloth to fasten the victim firmly to the support.

4. Hold the injured person by the clothing, and slide or pull the victim onto the support. **DO NOT ATTEMPT TO LIFT THE VICTIM UNLESS YOU HAVE ADEQUATE ASSISTANCE.** Remember, any bending or twisting of the body is almost certain to cause serious damage to the spinal cord. If there are at least four (preferably six) people present to help lift the victim, they can probably accomplish the job without much movement of the victim's body. All the helpers should clearly understand the best method for keeping the victim's head and body as rigid as possible. A smaller number of persons should NEVER attempt to lift the victim.

5. **GET MEDICAL HELP AT ONCE.**

FRACTURE OF THE PELVIS

The large pelvic bones (sometimes called the hip bones) and the lower bones of the spinal column make up the bony structure known as the **PELVIS.** The joint between the thighbone (the long bone of the upper part of the leg) and the pelvic bone is called the **HIP JOINT.**

Fractures in the pelvic region often result from falls, heavy blows, and accidents that involve crushing. The greatest danger in any pelvic fracture is that the organs that are enclosed and protected by the pelvis may be seriously damaged when the bony structure is fractured. In particular, there is danger that the bladder will be ruptured. There is also danger of severe internal bleeding, because the large blood vessels in the pelvic region may be torn or cut by fragments of the broken bone.

The primary symptoms of a fractured pelvis are severe pain, shock, and loss of ability to use the lower part of the body. The victim is unable to sit or stand. If conscious, the victim may feel as though his body is "coming apart." If the bladder is injured, the victim's urine may be bloody.

Do not move the victim unless **ABSOLUTELY** necessary.

Treat the victim for shock. Keep him comfortably warm. Do not attempt to place the victim in the shock position, as this may produce further damage internally.

If you must transport the victim to another place, handle him with the utmost care. Use a rigid stretcher, a padded door, or a wide board. Keep the victim lying on his back, with his face up. In some cases, the victim will be more comfortable with his legs straight. In other cases, the victim will be more comfortable with the knees bent and the legs drawn up. After you have placed the victim in the most comfortable position, immobilize him by placing bandages around the legs at the knees and ankles. Then place a pillow beside each hip and fasten each pillow securely with bandages or pieces of cloth. Finally, fasten the victim securely to the stretcher or improvised support, and obtain medical help immediately.

INJURIES TO JOINTS AND MUSCLES

Injuries to the joints and muscles often occur together, and it is sometimes difficult to tell whether the primary injury is to a joint or to the muscles, tendons, blood vessels, and nerves near the joint. Sometimes it is difficult to distinguish joint or muscle injuries from fractures. In case of doubt, **ALWAYS** treat any injury to a bone, joint, or muscle as if it were a fracture.

In general, joint and muscle injuries may be classified into four categories: (1) dislocations, (2) sprains, (3) strains, and (4) contusions (bruises). Now let us discuss these four types of injuries and see how to recognize and treat them.

DISLOCATIONS

When a bone is forcibly displaced from its joint, the injury is known as a **DISLOCATION**. In some cases, the bone slips back quickly into its normal position; in other cases, it becomes locked in the new position and remains dislocated until it is put back into place. Dislocations are usually caused by falls or blows but are occasionally caused by violent muscular exertion. The joints that are most frequently dislocated are those of the shoulder, hip, finger, and jaw.

A dislocation is likely to bruise or tear muscles, ligaments, blood vessels, tendons, and nerves near the joint. Rapid swelling and discoloration, loss of ability to use the joint, and severe pain and shock are characteristic symptoms of dislocations. The fact that the injured part is usually stiff and immobile, with marked deformity at the joint, will help you to distinguish a dislocation from a fracture. In a fracture, you will remember, there is deformity **BETWEEN** joints, rather than **AT** joints, and there may be a wobbly motion of the broken bone at the point of fracture.

As a general rule, you should **NOT** attempt to reduce a dislocation - that is, put a dislocated bone back into place - unless you know that medical assistance cannot be obtained within 3 or 4 days. Unskilled attempts at reduction may cause great damage to the nerves and blood vessels or may actually fracture the bone. Therefore, except in great emergencies, you should leave this treatment to trained personnel and concentrate your efforts on making the victim as comfortable as possible under the circumstances. The following first aid measures will be helpful:

1. Loosen the clothing around the injured part.
2. Place the victim in the most comfortable position possible.
3. Support the injured part by means of a sling, pillows, bandages, splints, or any other device that will make the victim comfortable.
4. Treat the victim for shock.
5. Get medical help as soon as possible.

You should **NEVER** attempt to reduce the more serious dislocations, such as those of the shoulder or hip. However, if it is possible that the victim cannot be treated by a medical officer within a **REASONABLE TIME**, you should make a careful effort to reduce minor dislocations, such as those of the jaw or finger.

Dislocation of the Jaw

When the lower jaw is dislocated, the victim cannot speak or close his mouth. Dislocation of the jaw is usually caused by a blow on the mouth; sometimes it is caused by yawning or laughing. This type of dislocation is not always easy to reduce, and there is considerable danger that the operator's thumbs will be bitten in the process. For your own protection, wrap your thumbs with a handkerchief or bandage. Stand in front of the victim facing him. Place your thumbs inside the victim's mouth. Now press down with your thumbs just behind the last lower molars. At the same time, lift the chin up with your fingers. The jaw should snap into place at once. You will have to remove your thumbs quickly in order to avoid being bitten. No further treatment is required, but you should warn the victim to keep his mouth closed as much as possible during the next few hours.

Figure 6-8 illustrates the position you must assume in order to reduce a dislocated jaw.

Dislocation of the Finger

The joints of the finger are especially susceptible to injury, and even minor injuries may result in prolonged loss of function. Great care must be used in treating any injury of the finger.

To reduce a dislocation of the finger, grasp the finger firmly and pull it slowly into position. If it does not go into position, try it again. If it does not go into position on the second attempt, **DO NOT TRY AGAIN**. In any case, whether or not the dislocation is reduced, the finger should be strapped or splinted until the victim can receive medical attention.

Figure 6-9 shows how a dislocated finger can be immobilized by strapping it to a flat wooden stick, such as a tongue depressor.

SPRAINS

A SPRAIN is an injury to the ligaments that support a joint. A sprain usually involves a momentary dislocation, with a bone slipping back into place of it's own accord. A sprain is caused by the violent wrenching or twisting of the joint beyond its normal limits of movement. Although any joint may be sprained, sprains of the ankle, wrist, knee, and finger are most common.

Tearing of the supporting ligaments is probably the most serious part of a sprain, but there is also a considerable amount of damage to the blood vessels and other soft tissues that surround the joint. When the blood vessels are damaged, some of the blood may escape into the joint itself and into the tissues. This causes the severe pain and marked swelling that are characteristic of a sprain.

To treat a sprain, immobilize the injured joint with some type of splint or with a snugly fitting adhesive or elastic bandage. This supports the joint and puts the ligaments at rest. Carefully loosen the bandage if it becomes so tight that it interferes with circulation of the blood.

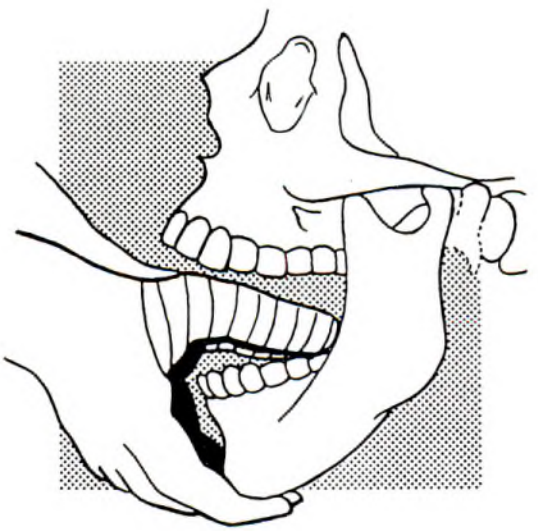


Figure 6-8.—Positioning for reducing dislocated jaw.

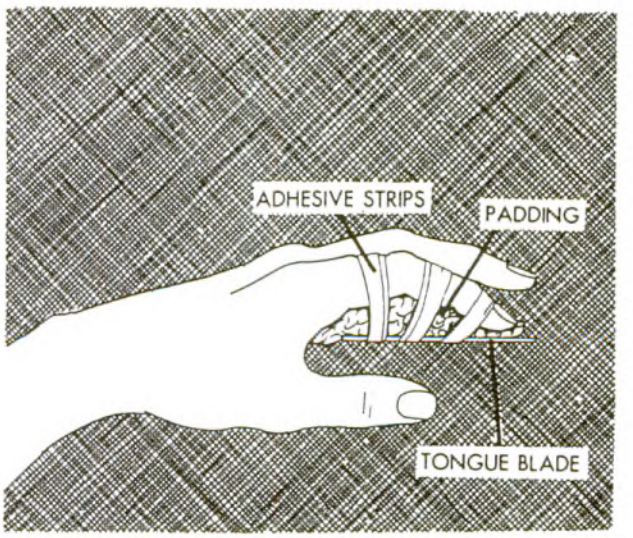


Figure 6-9.—Immobilization of dislocated finger.

Remember that the injured part may continue to swell, so a bandage that is loose enough when applied may soon become too tight. Elevate the injured part, if possible. This will help to reduce the pain and swelling. Apply **COLD** cloths or an ice bag to the injured joint for the first 24 hours, and apply **WARM** compresses after 24 hours.

CAUTION: It is difficult to tell the difference between a sprain and a fracture. If you are not sure which injury is present, always treat it as a fracture until the victim has been brought under the care of a medical officer or until improvement rules out the possibility of a fracture.

STRAINS

An injury caused by the forcible excessive stretching or tearing of a muscle or tendon is known as a **STRAIN**. Strains may be caused by lifting excessively heavy loads, by sudden or violent movements, or by any other action that pulls the muscles beyond their normal limits.

The chief symptoms of a strain are pain, lameness, or stiffness (sometimes involving knotting of the muscles), moderate swelling at the place of injury, and discoloration due to the escape of blood from injured blood vessels into the tissues.

The general treatment for strains is rest. If the injured muscle is in the arm or leg, elevate the part. Apply **COLD** compresses or an ice bag to the area.

CONTUSIONS

CONTUSIONS, commonly called bruises, are responsible for the discoloration that usually accompanies injuries to the bones, joints, and muscles. Contusions are caused by blows that damage bones, muscles, tendons, blood vessels, nerves, and other body tissues, although they do not necessarily break the skin.

The symptoms of a contusion, or bruise, are familiar to everyone. There is immediate pain when the blow is received. Swelling occurs because blood from the broken vessel oozes into the soft tissues under the skin. At first, the injured area is reddened due to local skin irritation from the blow. Later, the characteristic "black and blue" marks appear. Finally, perhaps several days later, the skin is yellowish or greenish in color. The bruised area is usually very tender.

In general, slight bruises do not require treatment. However, if the victim has severe bruises, treat him for shock. Immobilize the injured part, keep it at rest, and protect it from further injury. Sometimes the victim will be more comfortable if the bruised area is bandaged firmly with an elastic or gauze bandage.

If possible, elevate the injured part. A sling may be used for a bruised arm or hand. Pillows or a folded blanket may be used to elevate a bruised leg. Apply COLD cloths or an ice bag to a fresh bruise.

CAUTION: Extensive bruising may be very serious. In such cases, always obtain medical attention for the victim at the earliest opportunity.

CHAPTER 7

INJURIES FROM HEAT AND COLD

Exposure to temperature extremes, whether heat or cold, causes injury to skin, tissues, blood vessels, vital organs, and sometimes, to the entire body. In this chapter, we will discuss the injuries that are caused by the extremes of heat or cold, and the first aid treatment that should be given for them.

HEAT INJURIES

Burns, heat cramps, heat exhaustion, and heat stroke are the injuries most commonly caused by exposure to extreme heat. Burns caused by contact with acids, alkalies, and other chemicals are not true heat burns. However, they will be discussed here because many people think of them as burns and do not realize that they require special treatment.

BURNS AND SCALDS

Burns and scalds are caused by exposure to intense heat, such as that generated by fire, sunlight, hot liquids and solids, and hot gases. Contact with electric current also causes burns, especially if the skin is dry. Dry skin offers about 20 times more resistance than moist skin to the passage of electric current. Therefore, when the skin is dry, the local heating effects (burns) are greater, even though the total damage to the body is less than when the skin is wet.

It should be noted that burns and scalds are essentially the same type of heat injury. When the injury is caused by dry heat, it is called a burn; when caused by moist heat, it is called a scald. Treatment is the same in both cases.

Classification of Burns

Burns are classified in several ways: by the extent of the burned surface, by the depth of the burn, and by the cause of the burn. Of these, the extent of the body surface burned is the most important factor in determining the seriousness of the burn and plays the greatest role in the casualty's chances for survival.

In calculating the extent of burned surface, the **RULE OF NINES** is used, which is illustrated in figure 7-1. These figures aid in determining the correct treatment for the burned person. Shock can be expected in adults with burns over 15 percent or in small children with burns over 10 percent of the body surface area. In adults, burns involving more than 20 percent of the body surface area endanger life and 30 percent burns are usually fatal if adequate medical treatment is not received.

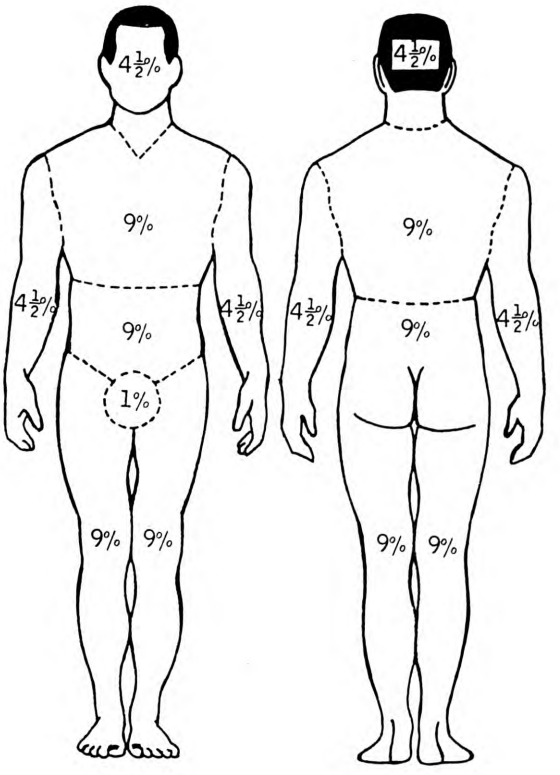


Figure 7-1.—Rule of nines.

The depth of injury to the tissues is spoken of in degrees. **FIRST DEGREE** burns are the mildest, producing redness, increased warmth, tenderness, and mild pain. **SECOND DEGREE** burns redden and blister the skin and are characterized by severe pain. **THIRD DEGREE** burns destroy the skin and can destroy the muscle tissue and bone in severe cases. Severe pain may be absent because nerve endings have been destroyed. The color may vary from white and lifeless from extreme heat to black and charred from flame. Figure 7-2 shows the appearance of first, second, and third degree burns.

It is important to remember that the size of the burned area may be far more important than the depth of the burn. A first degree burn that covers a very large area of the body is usually more serious than a small third degree burn. A first degree sunburn, for example, can cause death if a very large area of the body is burned.

The causes of burns are generally classified as thermal (heat), chemical, electrical, or radiation. Whatever the cause, shock always results if the burns are extensive.

Thermal Burns

Thermal burns are caused by exposure to intensely hot solids, liquids, or gases. Their care depends upon the severity of the burn and the percentage of the body involved. Minor burns, such as first degree burns over less than 20 percent of the body area and small second degree burns, do not usually require immediate medical treatment. Burns of the face are the exception to this rule. The following are general rules for treating burn victims.

1. Examine for and relieve any respiratory distress. Always anticipate respiratory difficulty when there are burns around the face or if the victim has been exposed to hot gases or smoke, since these may cause the airway to swell shut. Keep the airway open by tilting the chin up and forward, or if necessary, by holding the tongue down with a flat object. Place the victim who has facial burns in a sitting position, as this will further ease his breathing. Transport the victim of facial burns to a medical treatment facility as soon as possible for further evaluation.

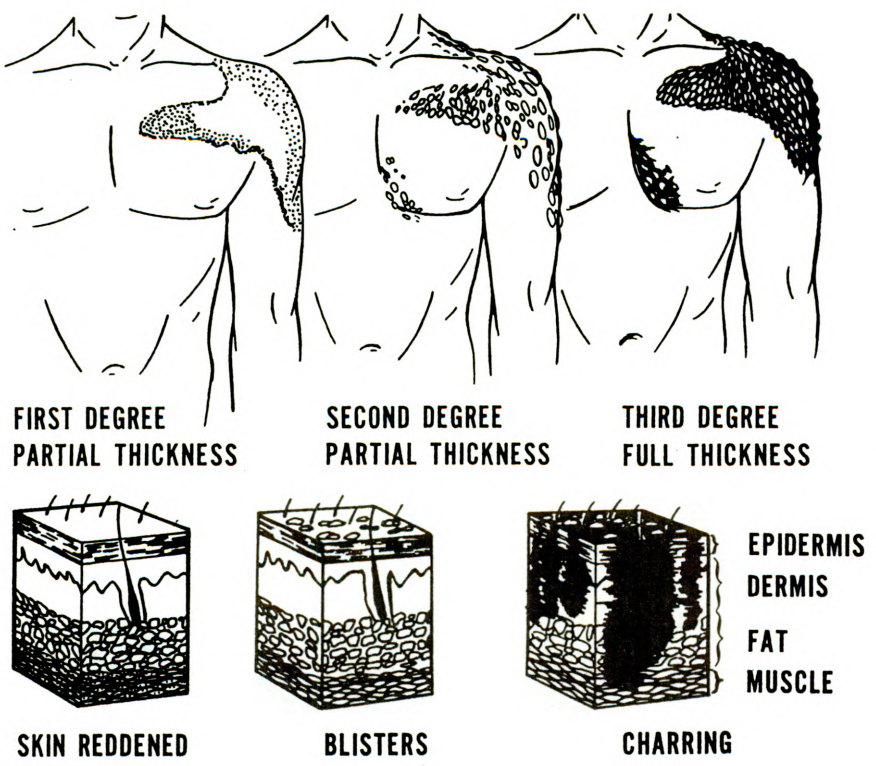


Figure 7-2.—First, second, and third degree burns.

2. Remove all rings, bracelets, and similar articles, even from uninjured areas, since swelling may develop rapidly and be severe.

3. To relieve pain initially, apply cold compresses to the affected area or submerge it in cold water. Cold water not only minimizes pain, but also reduces the burning effects in the deep layers of the skin. Gently pat the area dry with a lint-free cloth or gauze. Aspirin is also effective for the relief of pain.

4. Cover the burned area with a sterile dressing, clean sheet, or unused plastic bag. When the hands and feet are involved, dressings must be applied between the fingers and toes to prevent the skin surfaces from sticking to each other. Coverings such as blankets or other material with a rough texture should not be used because lint may contaminate and further irritate the injured tissues.

5. Do not attempt to break blisters, and do not remove shreds of tissue or adhered particles of charred clothing. Never apply greasy substances (butter, lard, or petroleum jelly), antiseptic preparations, or ointments. These may cause further complications and interfere with later treatment by a physician.

6. If the victim is conscious and not vomiting, prepare a weak solution of salt (1 teaspoon) and baking soda (1/2 teaspoon) in a quart of warm water. Allow the victim to sip the drink slowly.

7. Treat for shock. Maintain the victim's body heat, but do not allow him to become overheated.

8. If the victim's hands, feet, or legs are affected, they should be elevated higher than the heart.

9. If the burn victim is to be transported to a medical facility, try to contact the facility before he arrives to allow the facility time to prepare for immediate treatment. Inform them of the degree of the burn, the location, and the percentage of the body area involved.

Chemical Burns

When acids, alkalies, or other chemicals come in contact with the skin or other body membranes, they can cause injuries that are generally referred to as chemical burns. For the most part, these injuries are not caused by heat, but by direct chemical destruction of body tissues. The areas most often affected are the extremities, mouth, and eyes. Alkali burns are usually more serious than acid burns; alkalies generally penetrate deeper and burn longer.

When such burns occur on board ship, or in the shop, emergency measures must be carried out immediately without waiting for the arrival of medical personnel. The following procedures should be followed when you are treating chemical burns.

1. Begin flushing the area immediately with large amounts of water, using a shower or hose if available. Do not apply water too forcefully. Continue to flood the area for at least 5 minutes while the clothing, including shoes and socks, is being removed as well as afterwards. **NOTE:** There are two exceptions to the above. In alkali burns caused by dry lime, the mixing of water and lime creates a very corrosive substance. Dry lime should be removed by brushing the material from the skin and clothing unless massive amounts of water are available for rapid and complete flushing. In acid burns caused by phenol (carbolic acid), wash the affected area with alcohol because phenol is not soluble in water. Then wash the area with large quantities of water. If alcohol is not available, flushing with water is better than no treatment at all.

2. After thorough washing, neutralize any chemical that remains on the affected area. **WARNING:** Do not attempt to neutralize any chemical unless you are exactly sure what it is and what substance will effectively neutralize it. Further damage may be done by a neutralizing agent that is too strong or incorrect. For acid burns, mix a solution of 1 teaspoon of baking soda in a pint of water and flush it over the affected area. For alkali burns, use a dilute solution of vinegar to flush the area.

3. Flush again with water and gently pat it dry with a sterile gauze. Do not rub the area.

4. Transport the victim to a medical facility.

Electrical Burns

Electrical burns are more serious than they first appear. The entrance wound may be small, but as electricity penetrates the skin, it burns a large area below the surface, as illustrated in

figure 7-3. Usually there are two external burn areas; one where the current entered the body, and another where it left.

Before administering first aid, remove the victim from the electrical source. If power equipment is involved, shut it off or disconnect it immediately. If the victim is in an automobile accident and a live wire is lying on the car, pull the wire from the car, using a nonconducting dry rope or similar object. Stay away from the severed end of the power line because it can jump.

When rescuing a victim who has come into direct contact with a power line, stand on a well-insulated object, and use a dry rope or a wooden pole to either push or pull the wire away from the victim, or the victim away from the wire. See figure 7-4. Do not touch the victim until this is done or you too will become a casualty.

Electrical burns are often accompanied by respiratory failure and cardiac arrest, which are of more immediate danger to the victim than the burn itself. Start CPR (discussed in Chapter 2) immediately and continue until the victim regains a normal heartbeat and breathing pattern. Finally, lightly cover the site of the burn with a dry, preferably sterile dressing, treat for shock, and transport the victim to a medical facility.

Radiation Burns

This chapter is concerned only with the treatment of burns caused by solar radiation. The CBR chapter discusses the signs, symptoms, and treatment of radiation injuries caused by nuclear accident or war.

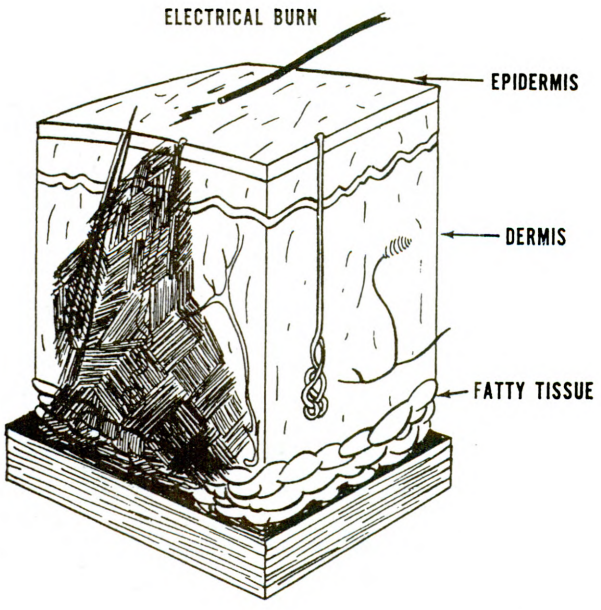


Figure 7-3.—Electrical penetration of the skin.

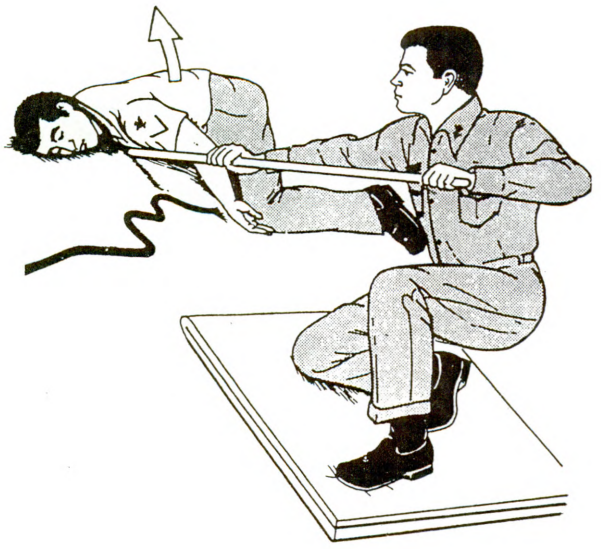


Figure 7-4.—Pushing a victim away from a power line.

Sunburn results from prolonged exposure to the ultraviolet rays of the sun. First and second degree burns may develop. Treatment is essentially the same as that already outlined for thermal burns. If the sunburn is not serious and the victim will not need medical attention, commercially prepared sunburn lotions and ointments may be applied.

White Phosphorous Burns

A special category of burn, which may affect military personnel in either a wartime or training situation, is that caused by exposure to white phosphorous (WP or "Willie Peter"). First aid for this type of burn is complicated by the fact that white phosphorous particles ignite upon contact with air.

Superficial burns caused by simple skin contact or burning clothes can be flushed with water and treated like thermal burns. Partially embedded white phosphorous particles must be continuously flushed with water while the first aid provider removes them with whatever tools are available, such as tweezers and needle-nose pliers. Do this quickly but gently. Firmly or deeply embedded particles that cannot be removed by the first aid provider must be covered with a saline soaked dressing which must be kept wet until the victim reaches medical personnel. When rescuing

victims from a closed space where white phosphorous is burning, protect your lungs with a wet cloth over your nose and mouth.

HEAT EXPOSURE INJURIES

Excessive heat affects the body in a variety of ways. When a person exercises in a hot environment, heat builds up inside the body. The body automatically reacts to get rid of this heat through the sweating mechanism. If the body loses large amounts of water and salt from sweating, heat cramps and heat exhaustion are likely to follow. When the body becomes overheated and cannot eliminate the excessive heat, heat stroke will result.

Heat Cramps

Heat cramps usually affect people who work in hot environments or who engage in strenuous exercise without acclimatization and proper training. Excessive sweating may result in painful heat cramps in the muscles of the abdomen, legs, and arms. Heat cramps may also result from drinking ice water or other cold drinks whether too quickly or in too large a quantity after exercise. Muscles cramps are often an early sign of approaching heat exhaustion. Muscle spasms of heat cramps usually last only a few minutes and disappear spontaneously.

To provide first aid treatment for heat cramps, move the person to a cool place. Since heat cramps are caused by loss of salt and water, give the victim plenty of water to drink, adding about 1 teaspoon of salt to a quart of water. Apply manual pressure to the cramped muscle, or gently massage it to relieve the spasm. In the event that the heat cramps do not pass or become more severe, other symptoms may follow and the victim should be treated as a heat exhaustion casualty and then transferred to a medical facility for further treatment.

Heat Exhaustion

Heat exhaustion is the most common condition resulting from exposure to hot environments. Heat exhaustion can be a combination of several entities and is therefore not an easy condition to diagnose. Due to different causes, for example, water depletion or salt depletion or a combination of both, the signs and symptoms may vary.

As a general rule, heat exhaustion will involve a serious disturbance of blood flow to the brain, heart, and lungs, which may cause the victim to experience weakness, fatigue, headache, loss of appetite, and nausea. He may faint but will probably regain consciousness when his head is lowered to improve the blood supply to his brain. The victim will appear ashen gray, his skin will be cold, moist, and clammy, and the pupils of his eyes may be dilated (enlarged). The vital signs are usually normal; however, the victim may have a weak pulse, together with rapid and shallow breathing. The body temperature may be below normal. Heat exhaustion is a very complex malady and is often misdiagnosed, even by medical personnel. You, as the first aid provider, should treat prolonged heat cramps and any heat injury that is obviously not heat stroke as heat exhaustion.

Care for the victim as if he were in shock (see Chapter 4). Move the victim to a cool air-conditioned area. Loosen the clothing, applying cool wet cloths to the head, axilla (armpits), groin, and ankles, and fan the victim. Do not allow the victim to become chilled (if this does occur, cover the victim with a light blanket and move him into a warmer area). If the victim is conscious, give a solution of 1 teaspoon of salt dissolved in a quart of cool water. If the victim vomits, do not give him any more fluids. Transport the victim to a medical facility as soon as possible.

Heat Stroke

Sunstroke is more accurately called heat stroke since it is not necessary to be exposed to the sun for this condition to develop. It is less common but far more serious than heat exhaustion since it carries a 20 percent mortality rate. The most important feature of heat stroke is the extremely high body temperature (105°F (41°C) or higher) that accompanies it. In heat stroke, the victim has a breakdown of his sweating mechanism and is unable to eliminate excessive body heat. If the body temperature rises too high, the brain, kidneys, and liver may be permanently damaged.

Sometimes the victim may have preliminary symptoms such as headache, nausea, dizziness, or weakness. Breathing will be deep and rapid at first, later it will be shallow and almost absent. Usually, the victim will be flushed, very dry, and very hot. His pupils will be constricted

(pin-pointed) and the pulse will be fast and strong. See figure 7-5 for a comparison of these symptoms with those of heat exhaustion.

When providing first aid treatment for heat stroke, keep in mind that this is a true life and death emergency. The longer the victim remains overheated, the more likely he is to suffer irreversible body and brain damage or death. The main objective is to get the body temperature down as quickly as possible.

Move the victim to the coolest possible place, and remove as much clothing as possible. Body heat can be reduced quickly by immersing the victim in a cold water bath. If a cold water bath is not possible, give the victim a sponge bath by applying wet, cold towels to the whole body. Exposing the victim to a fan or air conditioner will also promote body cooling. If cold packs are available, place them under the arms, around the neck, at the ankles and in the groin. If the victim is conscious, give him cool water to drink. Do not give any hot drinks or stimulants.

Because of the seriousness of heat stroke, it is important to get the victim to a medical treatment facility as soon as possible. Cooling measures must be continued during transport.

COLD WEATHER INJURIES

When the body is subjected to severely cold temperatures, the blood vessels constrict and body heat is gradually lost. As the body temperature drops, tissues are easily damaged or destroyed.

All cold injuries are similar, varying only in degree of tissue injury. The extent of injury depends on such factors as wind speed, temperature, type and duration of exposure, and humidity. Tissue freezing is accelerated by wind, humidity, or a combination of the two. Injury caused by cold, dry air will be less than that caused by cold, moist air or exposure to cold air while you are wearing wet clothing. Fatigue, smoking, drugs, alcoholic beverages, emotional stress, dehydration, and the presence of other injuries intensifies the harmful effects of cold.

You should also know that in cold weather, wounds bleed easily because the low temperatures keep the blood from clotting and increased bleeding, of course, increases the likelihood of shock. Wounds open to the cold air freeze quickly because as blood soaks the skin around the wound and the clothing is usually torn, the body loses heat. Therefore, early first aid treatment becomes even more important during periods of low temperature.

GENERAL COOLING (HYPOTHERMIA)

General cooling of the entire body is caused by continued exposure to low or rapidly dropping temperatures, cold moisture, snow, or ice. Those persons exposed to low temperatures for extended periods may suffer ill effects, even if they are well

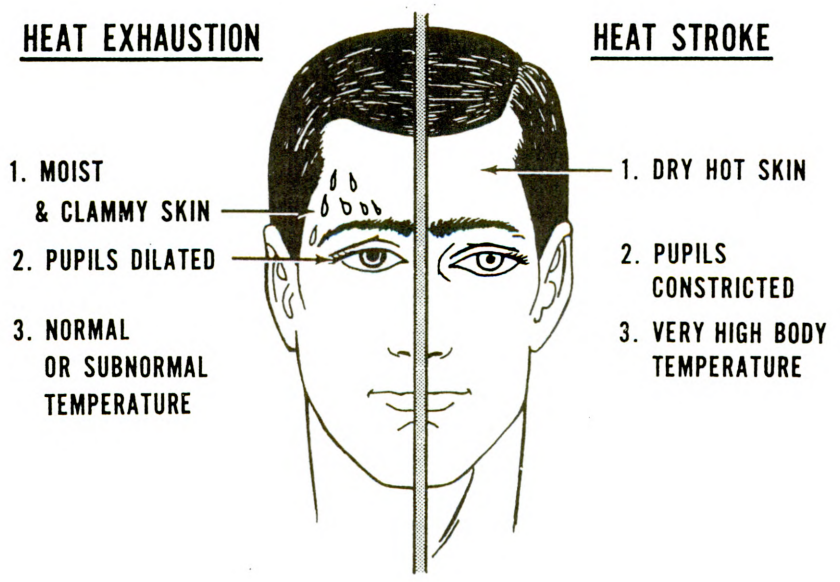


Figure 7-5.—Symptoms of heat stroke and heat exhaustion.

protected by clothing, because cold affects the body system slowly, almost without notice. As the body temperature drops, there are several stages of progressive shivering, which is an attempt by the body to generate heat. This is followed by a feeling of listlessness, drowsiness, and confusion. Unconsciousness may follow quickly. You will have already noted signs of shock (described in Chapter 4). As the temperature drops even lower, the extremities (arms and legs) freeze. Finally, death results.

Hypothermia is a **MEDICAL EMERGENCY. THE VICTIM NEEDS HEAT**. Rewarm the victim as soon as possible. It may be necessary, however, to treat other injuries before the victim can be moved to a warmer place. Severe bleeding must be controlled and fractures splinted over clothing before the victim is moved.

If the victim is inside a warm place and is conscious, the most effective method of warming him is immersion in a tub of warm water (100° to 105°F (38° to 41°C) or warm to the elbow - never hot). If a tub is not available, apply external heat to both sides of the victim, using covered hot water bottles or, if necessary, any sort of improvised heating pads. Do not place artificial heat next to bare skin. If immersion is used, only the body, not the limbs, should be immersed. Immersion of the arms and legs causes cold blood to flow from them to the body core, causing further detrimental cooling of the core. Dry the victim thoroughly if water is used to rewarm him. The most frequently recommended field treatment is "buddy warming." Since the victim is unable to generate body heat, merely placing him under a blanket or in a sleeping bag is not sufficient. For best results, the nude victim should be placed in a sleeping bag with two volunteers stripped to their shorts to provide body-to-body heat transfer. This technique can be employed by untrained personnel in a tent in the field and WILL SAVE LIVES!!

If the victim is conscious, give him warm liquids to drink. Hot tea with lots of sugar is particularly good. No alcoholic beverages should be used.

As soon as possible, transfer the victim to a medical treatment facility, keeping him warm enroute. Be alert for signs of respiratory failure and cardiac arrest during transfer.

IMMERSION FOOT (TRENCHFOOT)

Immersion foot, which may also occur in the hands, is a cold injury resulting from prolonged exposure to wet cold temperatures just above freezing. It is often associated with limited motion of the extremities and water-soaked clothing. Remember that the temperature does not need to be below 32°F (0°C) to cause this injury.

In the early stages, the feet and toes are pale and feel cold, numb, and stiff. Walking becomes difficult. If preventive action is not taken, the feet will swell and become painful. In extreme cases, the flesh dies and amputation of the foot or leg may be necessary.

In treating immersion feet (or hands), handle the injured part very gently. They should not be rubbed or massaged.

Get the victim off of his feet as soon as possible. Remove wet shoes, socks, and gloves to improve circulation. Do not rupture blisters or apply salves or ointments. The feet may be cleansed carefully with soap and water, dried, elevated, and exposed to dry air. Keep the victim warm and transport him to a medical treatment facility as soon as possible. Always evacuate immersion foot victims by litter.

FROSTBITE

Frostbite occurs when ice crystals form in the skin or deeper tissues after exposure to a temperature of 32°F (0°C) or lower. Depending upon the temperature, altitude, and wind speed, the exposure time necessary to produce frostbite varies from a few minutes to several hours. The areas most commonly affected are the face and extremities.

The symptoms of frostbite are progressive. Victims generally incur this injury without being acutely aware of it. Initially, the affected skin reddens, and there is an uncomfortable coldness. With continued heat loss, there is a numbness of the affected area due to reduced circulation. As ice crystals form, the frozen extremity appears white, yellow-white, or mottled blue-white, and it is cold, hard, and insensitive to touch or pressure.

Frost bite is classified as superficial or deep, depending on the extent of tissue involvement.

Superficial Frostbite

In superficial frostbite, the surface of the skin will feel hard, but the underlying tissue will be soft, allowing it to move over bony ridges. This is evidence that only the skin and the region just below it are involved.

Minor cases of superficial frostbite are fairly common and serve as a warning. Superficial frostbite can usually be thawed with body heat. Hands can be rewarmed by placing them under the armpit, against the abdomen, or between the thighs. Feet can be rewarmed by using a buddy's armpit or abdomen. Other areas of superficial frostbite can be rewarmed by warm water immersion, skin to skin contact or covered by hot water bottles. **NEVER RUB A FROSTBITTEN AREA.**

Deep Frostbite

In deep frostbite, the freezing reaches into the deep tissue layers. There are ice crystals in the entire thickness of the extremity. The skin will not move over bony ridges and feels hard and solid.

The objectives of treatment are to protect the frozen area from further injury, to rapidly thaw the affected area, and to be prepared to respond to circulatory or respiratory difficulties.

Carefully assess and treat any other injuries first. Constantly monitor the victim's pulse and breathing since respiratory and heart problems can develop rapidly. Be ready to administer CPR.

Make no attempt to thaw the frostbitten area if there is a possibility of refreezing. Freeze-thaw-freeze will extend the injury and may result in the need for amputation.

Treat all victims with injuries to feet or legs as litter cases. When this is not practical, it has been proven that walking will not lessen the chances for successful treatment as long as the limb has not been thawed out.

When adequate protection from further cold exposure is available, prepare the victim for rewarming by removing all constricting items of clothing, such as gloves, boots, and socks. Boots and clothing frozen on the body should be thawed by immersing them in warm water before removal.

Rapidly rewarm frozen areas by immersion in water at 100°F to 105°F (30°C to 41°C). Keep the water warm by adding fresh hot water, but do not pour it directly on the injured area. Ensure that the frozen area is completely surrounded by water; do not let it rest on the side or bottom of the tub. After rewarming has been completed, pat the area dry with a soft towel. Avoid pressure, rubbing, or constriction of the injured area. Keep the skin dry with sterile dressings, and place cotton between the toes and fingers to prevent them from sticking together.

The general morale and comfort of the victim might improve by hot, stimulating fluids such as tea or coffee. Do not allow the victim to smoke or use alcoholic beverages while he is being treated at the first aid level.

NEVER attempt to thaw frozen parts by rubbing, exercising them, or by heating them in front of an open fire.

Transport the victim to a medical treatment facility as soon as possible. During transportation, slightly elevate the frostbitten area and keep the victim and the injured area warm. **DO NOT ALLOW THE INJURED AREA TO BE EXPOSED TO THE COLD.**

CHAPTER 8

CBR AGENT CASUALTIES

It is common knowledge that any poison entering your body can result in sickness or death. When chemical, biological, and radiological (CBR) warfare agents are used, poisons are released and casualties are almost certain.

The purpose of CBR warfare is to produce casualties. The agents used in CBR warfare may be strange to you; however, the physical problems they cause are familiar enough.

Results similar to those occurring from chemical warfare, frequently referred to as "gas warfare," can be seen in everyday events. Many automobile drivers have died from the effects of carbon monoxide gas. Firemen, also, have been overcome by deadly fumes. You have probably used chemicals such as fly spray to kill flies. The chemical agents used in chemical warfare are more deadly and cover larger areas than fly spray - and they are aimed at you.

Next, consider biological warfare, commonly referred to as "germ warfare." A few harmful germs are present in everyday living and may result in such illnesses as the common cold and diarrhea. Most contagious diseases such as measles, mumps, and chicken pox are caused by germs getting into the body. Although only a small percentage of germs are so serious that they can result in death, you may have known people who contracted these germs and died. Germ warfare is a man-made attempt to use biological agents to produce disease or death in man, animals, and plants.

Finally, consider the use of radiological warfare. Man has always been exposed to radiation in the form of cosmic rays from the sun and naturally occurring radioactive materials. In a nuclear explosion, radiation is present in dangerous amounts, although the heat and blast present are much more deadly.

In brief, CBR agents are poisons in the form of gases, liquids, solid particles, smokes, germs or germ products, and radioactive materials used in warfare to produce death, injury, or discomfort.

CHEMICAL WARFARE

Chemical warfare is the deliberate use of a variety of chemical agents in gaseous, solid, or liquid states. These agents are toxic (poisonous) chemicals, which can produce death, injury, or irritating effects.

Chemical agents attack the body and produce specific damage depending upon the nature of the agent used. Common agents are:

1. Nerve agents
2. Blister agents
3. Incapacitating agents
4. Blood agents
5. Choking agents
6. Vomiting and tear agents

NERVE AGENTS

Of great importance because of their action on your nervous system is a group of agents called "G-AGENTS." We will refer to them simply as nerve agents. They are quick killers, odorless, almost colorless liquids; very small amounts result in dimmed vision, headache, dizziness, and nausea. Upon entering your body through the nose, skin, or mouth, nerve agents will interfere with breathing and may cause convulsions, paralysis, and death. The first effects are usually headache, difficulty in vision, and constriction of the eye pupils to pinpoint size. These effects are usually followed by a runny nose, nausea, stomach cramps, rapid breathing, tightness of the chest, twitching muscles, and cessation of breathing. This is the most significant group of killer agents.

It must be stressed here that protection against nerve agents requires the following four actions:

1. Speed in detection
2. Speed in masking
3. Speed in giving the alarm
4. Speed in self-aid and first aid

BLISTER AGENTS

Blister agents can cause severe blistering of the exposed skin. The result can be far worse than a serious case of sunburn. In either liquid or vapor form, these agents irritate and blister any part of the body that they contact. Blister agents can be effective in small amounts; a drop the size of a pinhead may produce a blister the size of a quarter. These agents are more effective in hot weather than in cold weather. They first affect the moist parts of the body (bends of arms and knees, armpits, and groin). People who are sweating are especially subject to severe burns. If you are exposed to blister agents, no changes will occur immediately. One to several hours will pass before your skin starts to turn red. It will be hours or even days later before the blisters appear. However, the damage is inflicted during the first few minutes of exposure. That is the reason why speed (stressed later in the section on "Self-Aid") is so important.

Damage to the eyes may be worse than the effects on the skin. Gases and even liquids may irritate the eyes only mildly at first, or there may be no pain at all. In a few hours, however, your eyes will smart, become inflamed, and be sensitive to light. Tears and great pain will follow, and permanent injury may result. Some blister agents will cause the eyes immediate pain.

If breathed into the lungs, blister agents will inflame the throat and windpipe, producing a harsh cough. In a severe exposure this may result in pneumonia and death. Quick detection of blister agents and prompt protection against entry into the eyes, lungs, or skin is vital in order to escape harm. There is no known antidote or cure.

INCAPACITATING AGENTS

Incapacitating agents can cause mental symptoms and may also produce physical symptoms such as staggering gait, dizziness, and blurred vision. Some of these agents cause "fainting spells" and others cause severe muscle weakness. The mental symptoms often resemble alcoholic drunkenness; for example, individuals may act silly, giggle, or become angry and belligerent similar to a "fighting drunk." Sometimes incapacitating agents can cause hallucination. (Like alcoholic "DTs," victims may imagine that they see snakes or enemy soldiers, or they may imagine that colors have changed.) Many of these incapacitating gases prevent sleep. Some people may stay wide awake for 4 days and be mentally confused for the whole period. These agents do not kill, but they can make a man ineffective. Many of them do not produce effects until several hours after inhalation, but some can produce effects in as little as 30 minutes that may persist for several days.

BLOOD AGENTS

Blood agents get their name from the action they have on your blood. If you inhale these agents, the blood cannot furnish oxygen to the body cells. As a result, the body tissues will suffocate and die. Rapid breathing and violent convulsions are the main symptoms when large amounts of blood agents are inhaled. A mild exposure may produce headache, dizziness, and nausea. Blood agents will either cause a speedy death, or complete recovery will occur within a few hours. With these agents, it is very hard to build up effective concentrations in the air. However, like the nerve agents, blood agents are quick killers; therefore, speed in masking is essential.

CHOKING AGENTS

The lungs are the target for choking agents. If you can avoid breathing these agents, you are safe since they do not harm your skin or digestive system. Choking agents will actually choke an unprotected person. If large amounts enter the lungs, the lungs will become filled with liquid, and death may result from lack of oxygen. Your protective mask gives you complete protection against all choking agents. The instant you suspect the presence of a chemical agent, carry out these three actions as quickly as possible:

1. Stop breathing
2. Put on your protective mask
3. Clear your mask

VOMITING AND TEAR AGENTS

Vomiting and tear agents, also known as "riot control agents," can produce unpleasant symptoms, which usually last for a short period. When properly used, these agents do not cause death. They are used to control riots, to force people out of buildings or caves, and, occasionally, to capture enemy forces without injury. These agents are also often used for training purposes.

Vomiting Agents

Inhaling vomiting agents can make you ill. A sense of fullness in the nose, severe headache, intense burning in the throat, and tightness and pain in the chest are the general symptoms. These symptoms are followed by uncontrollable coughing, violent sneezing, nausea, and vomiting.

Remember that symptoms may be delayed for several minutes. If you should inhale a vomiting agent before placement of the protective mask, you might become ill after the mask is placed. It would be natural, of course, to think that the mask is leaking and to take it off. If you do so, however, you will be exposed to more of the agent. This would be disastrous if the vomiting agent was combined with nerve, blister, or blood agents. It is possible that the enemy forces would do just this. The result would kill or seriously injure the person who took the mask off because he was ill. **YOU MUST WEAR YOUR PROTECTIVE MASK AS LONG AS THE AGENT IS PRESENT. PULL IT AWAY FROM THE CHIN (DO NOT TAKE IT OFF) DURING THE ACTUAL VOMITING.** The mask offers adequate protection against vomiting agents. The undisciplined person, feeling terribly ill, will remove his mask and die, if toxic agents are present. In contrast, the disciplined person, with as great an urge to take off his mask, will keep it on and live. The effects of vomiting agents will usually disappear in 20 minutes to 2 hours.

Tear Agents

Tear agents are the least toxic of the six groups of chemical agents. They are discussed in this manual because you will encounter them during your training. These agents may also be used in civil riots to disperse the crowds or to squelch prison riots. The vapors of tear agents can produce a sharp, irritating pain in the eyes, resulting in an abundant flow of tears. There is no permanent damage to the eyes, and the effects wear off quickly. The protective mask, placed before tear agents get into your eyes, will give complete protection. One of the purposes of the gas chamber exercise is to prove how effective the protective mask guards against agents that attack you through the nose, mouth, or eyes. In addition, some of the new tear agents can cause runny noses, severe chest pains, nausea, and vomiting.

DECONTAMINATION

The guiding principle in personnel decontamination is to avoid spreading contamination to clean areas and to manage casualties without aggravating other injuries. It will frequently be necessary to decide whether to handle the surgical condition or the chemical hazard first. If the situation and the condition of the casualty permit, personal decontamination should always be carried out first.

The decontamination of chemical hazards can be accomplished by removing, neutralizing, or destroying the chemical agent. The purpose of personal decontamination is to remove toxic substances from your body or personal equipment before serious injury occurs.

For instance, an example of **REMOVING** is pinch-blotting the agent from your skin; using the M258 decontamination kit to make the agent harmless is **NEUTRALIZING;** and **DESTROYING** is burning or burying a contaminated cloth that was used to blot off the agent.

Self-Aid

Self-aid or personal decontamination is solely your responsibility. If tactical conditions at the time of exposure require you to keep fighting, you must decontaminate at the earliest opportunity. In a chemical attack it will be a tragic error to wait for someone else to give you first aid. The need for speed requires you to be your own aidman.

Since there are definite time limits after which self-aid becomes useless, immediate personal decontamination is important if you are exposed to chemical agents. Decontamination either by neutralization or by removing the agent, or both, should be carried out before serious injury occurs. You may have to rely on whatever you have on hand to remove these agents from your skin, eyes, or equipment. If liquid nerve or blister agents touch any part of your body, you must remove them rapidly, for these agents can quickly penetrate the skin. If you are caught without the best removers, like the M258 decontamination kit or soap and water, then use anything that is available. It may be mud, gun oil, or even urine. A crude remover may get off only two/thirds of the agent, but it is better than nothing.

In addition, always carry a bar of soap with you. Soap is excellent for removal of chemical agents. If plenty of cold water is available, it will

be very effective, for you can pour it on for several minutes. Hot soapy water removes agents quickly. When you are removing any agent from your body with soap and water, scrub your body just as vigorously as a physician scrubs his hands before an operation. Exposed regions and hairy areas should be given extra attention.

Since speed is essential in self-aid, and because you may not know whether you have been contaminated with liquid nerve or blister agents, the following standard procedures must be observed to prevent injury from liquid agents:

1. Decontaminate the eyes and face, if necessary.
2. Mask.
3. Use the M258 or M258A1 kit for decontamination of the skin.
4. Throw away any contaminated clothing (or cut away the contaminated parts).
5. Use the antidote injector ONLY if you experience symptoms produced by nerve agents.

The self-aid procedures for specific agents are given in later sections and should be employed if the agent has been identified.

Decontamination Kit - M258 Series

The decontamination kit is issued for your use in applying self-aid to reduce or to avoid injury from chemical agents. Although decontamination kits are frequently evaluated and updated there is little difference among the decontamination kits in the M258 series. Figure 8-1 depicts a typical M258 decontamination kit. It contains the following items:

1. Gauze pads
2. Scraping sticks
3. Two plastic capsules of solution

Directions for using your M258 decontamination kit are as follows:

1. Take the cover off the kit.
2. Take a piece of gauze from the kit and blot up any liquid agent on your skin. Use a second gauze, if necessary
3. If the contaminant is thick or greasy, use the scraping sticks to remove as much of the agent as possible. NOTE: The used gauze and sticks will be contaminated; therefore, dispose of them carefully.
4. Remove the smaller of the two capsules marked "I," and punch a hole in the capsule with the spike on the cover. Take out a gauze pad and wet it. Now swab the contaminated skin with the wet pad. After you have thoroughly swabbed the contaminated area, dispose of the gauze.
5. Take out the capsule marked "II." Inside the flexible plastic capsule is a glass vial that must be broken. Use the heel of your boot or other hard object to break the vial. Vigorously shake the capsule at least a dozen times until the powder is dissolved. Then make a hole with the spike and wet another piece of gauze. Now swab the contaminated skin with the solution. This completes the skin decontamination procedure.

Self-Aid for Nerve Agents

If you notice any of the following symptoms, **MASK AT ONCE.**

1. A faint, sweetish fruity odor
2. The pupils of someone else's eyes shrinking to pinpoint size
3. Your sight blurring or dimming
4. Runny nose
5. Salivation
6. Chest tightness and difficulty breathing

If you are told that your pupils are getting very small, or if you are having trouble breathing and your chest feels tight, use the atropine autoinjector (also called the Atropine). The injector contains

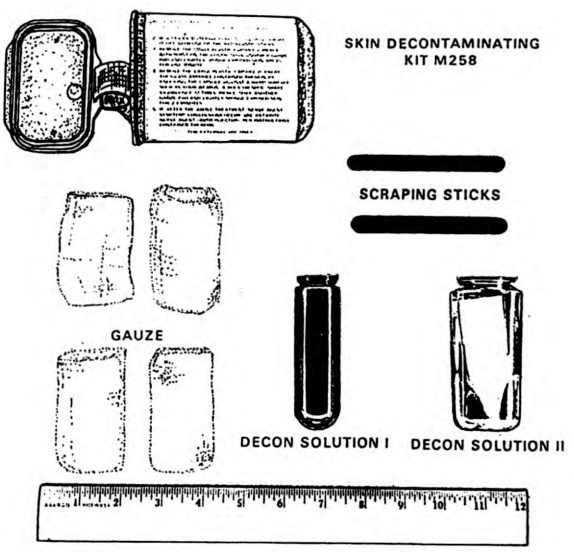


Figure 8-1.—M258 skin decontamination kit.

medication to treat the initial symptoms of nerve agent poisoning. But, most importantly, it will check the more serious effects of nerve agent sickness. The injector is an antidote, not a preventive device; therefore, only use the injector if you actually experience symptoms of nerve agent poisoning. See figure 8-2. Directions for use are as follows:

1. Pull off the injector's ridged safety cap.
2. Place the opposite end of the injector against your thigh.
3. Press down hard. Continue to press for at least 4 seconds to make sure you give yourself the whole injection.
4. After you remove the injector, rub the area for a couple of minutes. This will help to absorb the antidote. In about 10 to 15 minutes, you should feel better. If you do not improve or you feel worse, use a second antidote injection. In time of war, you will be issued three atropine autoinjectors.

CAUTION: Never give yourself more than three atropine injections. In addition, use them only in nerve gas poisoning.

Another type of automatic injector, the Combo-Pen autoinjector, may be issued to you. See figure 8-3. Complete directions for its use will be included with the injector.

Precautions in applying self-aid for nerve gas are as follows:

1. Do not take an injection from the Atropine until you are **SURE** you **NEED** it. Pinpointing of the eye pupils or blurred vision, tightness in the chest, and difficulty in breathing are signs that you need it. If you become excited and inject yourself when you have not been exposed to a nerve agent, you will become ill, especially in very hot weather. This could be a real danger in combat. However, if you really do inhale some nerve agent, the injector should make you feel better.

Figure 8-2.—Atropine auto injector.

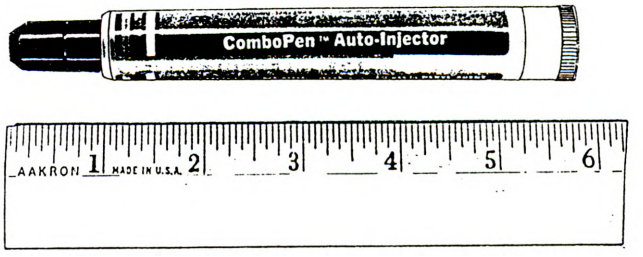


Figure 8-3.—Combo-Pen auto injector.

2. If you have inhaled a large dose of nerve gas vapor, you may need more than one injection of atropine to relieve your symptoms. If nerve agent symptoms persist, you may give yourself two more injections for a total of three. More than three injections may be given under the supervision of medical personnel, if available, or under the direction of the NCO or officer in charge.

3. Continue to perform your duties if you get good relief from the atropine and can breathe freely again. Dryness of the mouth is a good sign. It means that you have had enough atropine to overcome the dangerous effects of the nerve agent.

4. If you should get a splash of liquid nerve agent in your eyes, instant action is necessary to avoid serious injury. Obtain water as fast as possible, tilt your head back so that your eyes look straight upward, and slowly pour water into the contaminated eyes to flush them out. Hold the eyes open with the fingers, if necessary. Pour the water slowly so that the irrigation will last at least 30 seconds. This irrigation must be done in spite of the danger of breathing nerve gas vapor. Place your mask on quickly after completing the irrigation. Then, if the symptoms of nerve gas poisoning develop, give yourself an injection from the Atropine.

5. If liquid nerve gas gets on your skin or clothing, fast action is needed to get rid of it. Immediately use the M258 decontamination kit. Then carry on with your combat duties. Meanwhile, watch for any twitching in the muscles under the contaminated area. If no twitching develops in the next half-hour, and you have no tightness in your chest, your decontamination was successful and you can forget it.

6. If twitching of the muscles in the area of the contaminated skin does develop, do not wait for the appearance of other symptoms, but give yourself an injection from the Atropine at once. If no other symptoms develop, one injection is enough. The atropine will not relieve the local twitching of the muscles, but this twitching is not dangerous.

7. Avoid water and food that may be contaminated with nerve agent. Let the medical personnel check the food and water for safety before you consume them. If you have swallowed contaminated food or water, and all of the following symptoms appear - increased flow of saliva, nausea, pain in the stomach, and tightness in the chest - give yourself an injection from the Atropine.

First Aid for Nerve Agents

The following order of priority of first aid is recommended for a casualty who has been poisoned by a nerve agent:

1. If you suspect the agent is still present, put the mask on the victim.
2. Give the casualty an Atropine injection from his kit.
3. Give the victim artificial ventilation, if needed. Mouth-to-mouth is the best method, but if you are still masked, you must, of course, use another (manual) method. (Some of the latest protective masks, used by the Marine Corps, have a coupling and a hose so that you can connect up and give mouth-to-mouth artificial ventilation while you remain masked.)
4. Poisoning with nerve agents causes the mouth and throat to fill up with thick, sticky saliva. You may have to clear out the back part of the victim's mouth with a handkerchief, rag, or your fingers. Continue to check this, as it may make artificial respiration difficult.

Self-Aid for Blister Agents

If the blister agent gets into your eyes, treat them instantly, as every second counts. If there is no pain in your eyes, treat them with water only (as described below). If there is pain in your eyes, flush them with water and seek medical aid immediately.

1. Flush the eyes with water. The best method is to tilt the head back so that the eyes look straight upward. Pull the lids apart with the fingers of one hand. With the other hand, pour water slowly into the eyes. If only one eye is contaminated, direct the water from the bridge of the nose downward across the eye to prevent flushing the agent into the good eye. Try to regulate the flow of water so that the flushing lasts at least 30 seconds and not more than 2 minutes.
2. **SPEED** in decontaminating the eyes is **ABSOLUTELY ESSENTIAL.** Decontamination will be very effective for the mustard agents if it is applied within the first few seconds, but after 2 minutes it is not very beneficial.

The following measures are recommended for decontamination of the skin and clothing:

1. Use the M258 decontamination kit that was previously described.
2. If the contamination is discovered late, when no liquid blister agent is visible and reddening of the skin has begun, wash the contaminated area with soap and water. The decontamination kit will not be helpful at this stage.
3. Cut off hair that becomes contaminated with the liquid blister agent. Decontaminate the exposed scalp with the M258 decontamination kit.
4. If you're in a secure place, remove clothing that is contaminated with liquid blister agents. This applies to both ordinary clothing and to impregnated protective clothing. Decontaminate small areas with soap and water. The contamination may be too great to handle with the equipment you have. In this case, cut out the contaminated parts or do not wear the clothes. When you are able, boil them with soap and water. The only exception to this will be when you are wearing both impregnated long underwear and outer clothing and the contaminated drops are the size of a pinhead or smaller. The chemical in your impregnated clothes will take care of very small droplets.

Self-Aid and First Aid for Incapacitating Agents

By the time a victim of incapacitating agent exposure realizes something is wrong, he may be too confused mentally to handle his own decontamination. These cases should be taken to medical personnel immediately. If many people are affected, it may be necessary to confine them temporarily under guard to prevent accidents. These personnel must not be allowed to enter critical or dangerous spaces until complete

recovery is achieved, for these victims may not be responsible for their actions. In addition, some of these agents prevent sweating, which increases the danger of heat stroke on hot days.

Self-Aid for Blood Agents

The victim of blood agent exposure must first put on his mask and avoid unnecessary movements. If you have received a large dose, you will need the assistance of an aidman. He will give you AMYL NITRITE to inhale and will administer artificial ventilation, if necessary. You may have been issued amyl nitrite ampules, in which case you can give the amyl nitrite to yourself. Just squeeze the ampule until it pops. Insert two ampules inside the face piece of your mask under the eye lens. Repeat this at intervals of 3 or 4 minutes until normal breathing returns or until a total of eight ampules are used.

Self-Aid for Choking Agents

Upon detecting any phosgene in the air, put on your protective mask **IMMEDIATELY**. The odor is like new-mown hay or fresh cut corn. Phosgene can also be detected by irritation of the eyes. Try not to breathe while you are masking. Even if you have inhaled some phosgene, continue with your combat duties. However, if you have a difficult time breathing, feel nauseated, or vomit, take it easy and avoid unnecessary movements.

Self-Aid for Vomiting Agents

For protection against vomiting agents, put on your mask and wear it in spite of coughing, sneezing, salivation, or nausea. If necessary, briefly lift the mask from your face to permit vomiting or to drain saliva from the face piece. Clear your mask each time you adjust it to your face and before you resume breathing. CARRY ON WITH YOUR DUTIES as VIGOROUSLY as possible; this will help to lessen and to shorten the symptoms. Combat duties can usually be performed in spite of the effects of vomiting agents.

Self-Aid for Tear Agents

If liquid or solid agent has entered your eyes, force your eyes open and flush them with water. Put on your protective mask, cover the outlet valve, and blow hard to clear the mask. Keep your eyes open as much as possible. When your vision clears, continue to perform your duties. When it is safe to remove your mask, blot away tears, but do not rub your eyes. Face into the wind with your eyes open.

BIOLOGICAL WARFARE

Biological warfare is the deliberate use of germs or their poisonous products to produce disease, injury, or death in man, animals, or plants. It is the intentional use of biological agents that makes biological warfare new and dangerous.

You have been waging an individual fight against germs since you were born. The physician who delivered you at birth made certain that your eyes were disinfected and free from dangerous germs. Your mother guarded you against disease by frequently bathing your body, sterilizing your milk bottle, and keeping you away from people with colds. One of the first things you did upon becoming a sailor was to receive shots to protect you from diseases such as typhoid fever. During World War II, naval personnel in tropical areas were careful to take Atabrine to guard against malaria.

Any belief that biological warfare concerns a new or mysterious superweapon is not based on fact. Our fight against disease producing germs has been going on for hundreds of years. Biological warfare is a man-made attempt to produce disease on a large scale.

CHARACTERISTICS OF BIOLOGICAL WARFARE AGENTS

Since germs are alive, they behave in the same manner as other living things. They multiply, breathe, eat, grow, and die. They depend on moisture, food, and certain limits of temperature for life and growth. When their surroundings do not provide suitable conditions, they die. Most germs are killed by simple acts such as boiling water, adding chlorine tablets to water, cooking food, exposing them to sunlight, and using soap and water. Biological agents or their poisonous products attack your body by the same routes as chemical agents - through your nose, mouth, or skin.

In contrast to chemical agents, the presence of biological agents cannot be detected by the physical senses or by chemical detectors. Their presence or identity can be determined only by laboratory examination of air samples or

contaminated objects. The time lag between exposure and the onset of symptoms will usually be a matter of days, rather than hours, as is the case with most chemical agents. All persons will not be similarly affected even though exposed to the same dosage of biological agents. Some may escape disease entirely, some may have a very mild attack, and some may become seriously ill.

DANGERS OF BIOLOGICAL WARFARE

In spite of the Navy's excellent health program, biological warfare does hold dangers that you must be prepared to meet. There is little need to worry about new kinds of diseases in biological warfare. The new ways of spreading those diseases already known are the real danger to you.

When a person coughs or sneezes, tiny droplets of moisture are blown from his mouth and nose into the air. If he is ill, the spray may carry harmful germs to others. Scientists working in laboratories have found that they are able to spread disease germs in much the same manner, that is, floating germs in fine sprays or mists call aerosols. Aerosols might be used for large biological warfare attacks. They could be released from special sprayers carried by aircraft. When diseases are spread through the air in aerosols, anyone who breaths the mist is likely to get a number of germs in his lungs. In that vital spot, germs can easily be distributed to other parts of the body, making the person seriously ill.

PROTECTIVE MEASURES

Defense against biological warfare, like defense against chemical warfare, is neither simple nor easy. Individual protection against biological attack includes the use of protective equipment. The protective equipment used for defense against chemical agents may also be used for biological defense. In addition, your first line of defense against biological agents is the natural resistance of the body and the maintenance of the body in the best possible physical condition. Every time you drill, engage in physical exercise or sports, and eat nutritious meals, you are preparing strong defenses against biological agents. A high standard of personal cleanliness and careful attention to sanitation are your best insurance against the spread of disease. Such steps are bolstered by the shots you receive periodically.

The inhalation of airborne germs is considered to be the greatest potential hazard in biological warfare; therefore, your protective mask is an important component of defensive equipment. A properly fitted mask, which has been kept in good condition, will greatly reduce the danger of inhaling infectious material present in the air. Since you cannot detect the presence of biological agents, you may be ordered to use your protective mask and equipment until the danger has passed. Your commanding officer will base his decision upon information received from intelligence reports and the advice of his technical staff or higher headquarters.

To produce disease, germs must actually gain entrance into your body. If a great many germs collect on your skin, they might, in time, be transferred to a portal of entry, such as through your nose or mouth. Cuts or open sores are an invitation to germs trying to enter your body, therefore, make sure you keep cuts bandaged. Any type of clothing will provide some protection against biological agents. The degree of protection is dependent upon the size of the pores in the fabric and the number of layers of clothing being worn. To keep out germs and disease bearing insects such as mosquitoes, fleas, and ticks, it is important to fasten shirt and jacket collars, roll down sleeves and button cuffs, and to tie down all other clothes to stop the entry of germs that may be in the air or on the ground. The uniform you use for protection against chemical agents gives a higher degree of protection against biological agents than your ordinary clothing.

DECONTAMINATION

The extent to which decontamination can be accomplished following exposure to biological agents is dependent upon the existing tactical situation and the facilities available. Each person, however, is responsible for carrying out personal decontamination measures at the earliest opportunity.

If you are exposed to biological agents, scrub yourself thoroughly with soap and water as soon as the combat situation permits. Special attention should be given to your face and hands. To remove dirt from under your nails, a fingernail brush will be a useful item. Also, brush your teeth frequently - the roof of your mouth and tongue as well as the gums and teeth. When possible, carefully remove your contaminated clothes and take a bath or shower. All washable clothes polluted with germs should be scrubbed clean at the first opportunity.

Since food and water are especially susceptible to deliberate contamination, you should always be careful about the food and water you consume in combat. If you are told that a biological attack has occurred, you must be doubly cautious. One of the easiest ways to get biological agents inside your body is to swallow them along with your food and water. Additionally, do not forget that food and water are the natural homes of many disease producers. A few germs in your food can grow into millions in a very short period. It will be useful if you learn the commandments for defense against biological agents:

1. Remember the "BIO" sign; it means the area is contaminated with biological agents.
2. Do not pick and eat fruits or berries.
3. Do not chew grass or leaves.
4. Do not eat native food or drink native beverages. They may be contaminated intentionally or unintentionally.
5. Do not take souvenirs.
6. Consume only those beverages that are received from military sources.
7. Do not bathe in lakes or ponds.
8. Do not touch animals.

Survival Tips for Biological Warfare

The following survival tips are recommended for your protection:

1. **REPORT SICKNESS PROMPTLY.** If you become ill, notify your unit medical personnel immediately.

2. **KEEP YOURSELF AND YOUR QUARTERS CLEAN.** Do not foster the growth of germs by making it easy for them to multiply. Germs have trouble living in clean places. If you keep clean, the odds increase that you will not become ill.

3. **DO NOT NEGLECT PREVENTIVE MEDICINE.** Take shots, pills, or vaccinations at the appropriate periods.

4. **KEEP YOUR NOSE, MOUTH, AND SKIN COVERED.** When biological agents are known or suspected to be present, make sure you use all of your protective equipment.

5. **KEEP YOUR FOOD AND WATER PROTECTED.** Bottled or canned foods are safe after a biological attack if the seals are not broken. Food in the open will be contaminated. If in doubt, discard the food. Always clean cans, packages, etc., with soap and water before opening.

6. **BE ALERT FOR ANY SIGNS OF A BIOLOGICAL ATTACK.** Any clues such as new or unusual types of shell or bombs, strange material sprayed by airplanes, smokes or mists of unknown nature, or other strange substances should be reported to your CO immediately.

7. **WATCH OUT FOR BIOLOGICAL AGENT "BOOBY TRAPS."** The enemy may challenge your discipline and self-control by making available all sorts of tempting items of food or drink. To eat or drink these contaminated items may mean death.

TREATMENT OF CASUALTIES

There are no self-aid measures for the diseases that are caused by biological agents. In comparison to measles, the symptoms of biological diseases appear in a like manner. Although it may be a matter of days before it can be determined what types of biological agents are present, medical personnel will direct the decontamination of these casualties.

Even though the Navy provides preventive shots for some diseases, additional shots have been developed, which will be given to all hands if biological warfare ever occurs. If you should contract a disease from biological agents in spite of the shots, the sickness should be mild, and medical personnel will ensure that you receive the best treatment available.

RADIOLOGICAL WARFARE

Radiological warfare is the deliberate use of radiological weapons to produce injury and death in man. The explosion of a radiological weapon, similar to that of an ordinary bomb, causes damage by the heat and blast liberated at the time of detonation. In addition, the nuclear explosion presents a third danger, which is nuclear radiation. There is no need to become an expert on the nuclear bomb, but there are some facts that you must understand to protect yourself against this weapon and nuclear radiation. Nuclear radiation is emitted when the bomb explodes. This radiation may also be released by particles called radioactive fallout which may result from the bomb. These particles may cover large areas, which comprise many hundreds of miles.

DANGERS OF RADIATION

You have already had contacts with radiation. In the form of rays from the sun, you have been bombarded by radiation every day of your life. You have also had x-rays taken of your chest, which was done by sending invisible, but powerful, rays through your body. Other examples include radiation treatment for cancer patients, and heat and ultrasound treatments for physical therapy patients. Unlike the above examples which are mild or rigidly controlled, the radiation from a nuclear explosion is intense and uncontrolled, and therefore dangerous.

Radiation, like biological agents, cannot be detected by the physical senses. For example, when you receive an x-ray of your hand, you feel nothing. However, millions of x-rays have gone through your hand to the photographic plate. The more solid the area, the more x-rays have been absorbed or blocked. Too many exposures will cause injury or death to the cells and tissues, particularly the more sensitive blood forming tissues. This is why safety limits are established. X-ray machine operators are trained to limit their own exposure and are allowed to be exposed to limited amounts of radiation over a specific time frame. In addition, service personnel working in a radioactive or "hot" area will not be exposed to radiation beyond a safe limit, which will be determined by the commanding officer.

EFFECTS OF RADIATION

Although radiation is only one effect of a nuclear explosion, it has received widespread attention. To many people, this effect has an air of mystery. Predictions were made that Hiroshima would never again be a safe place to live after the dropping of the atomic bomb. There were many rumors and projections about the terrible injuries and sickness due to radiation. Nevertheless, Hiroshima has been rebuilt. At the present time, crops grown in that area are safe to eat, and the people are healthy and normal. The truth is that the heat and blast cause most of the injuries during a nuclear explosion.

However, there are two ways in which you can acquire an overdose of radiation: (1) You can be caught in the open when a nuclear bomb explodes nearby. If your distance from the point of explosion is great enough to protect you from the blast and heat, radiation cannot reach you. On the other hand, if you are in the open within 800 to 1000 yards from the burst, you will receive an overexposure to radiation. (2) Overexposure can also occur if you remain too long in an area which is contaminated from radioactive fallout. Your commander will tell you how long to stay in an area contaminated with radioactive fallout.

The first indication of an overdose of radiation probably will not occur for several hours or days. At that time, you will probably become ill with nausea and vomiting. The length of time it takes for these symptoms to appear generally depends on the extent of radiation exposure. The larger the dose, the quicker you will feel below par. But in spite of it all, you will still stand a better than even chance of complete recovery.

Types of Explosions

An **AIR BURST** is a nuclear explosion that occurs high in the air. This type of explosion does the greatest damage by blast and heat. The radiation from an air burst disappears quickly and is called **INITIAL RADIATION.**

A **GROUND** or **SURFACE BURST** is one that is low or on the surface. It causes less damage from the blast and heat. This burst produces radioactive fallout, which lasts for a long time period, and is called **RESIDUAL RADIATION.**

Since an air burst does the greatest damage, this is the kind of explosion you can most probably expect. With air burst explosions, the violent, upward surge of superhot gases and air sweeps radioactive ashes into the sky. Most of these particles are carried off in the drifting bomb clouds. Air explosions do not create "hot" areas. In fact, they leave almost no radiation on the ground. After a few minutes, your unit will be able to move across the center of destruction with no danger from the harmful rays.

Surface and underground bursts leave a limited "hot" area. These bursts will also limit the time that the fighting forces can safely remain in the target area.

PROTECTIVE MEASURES

In order to protect yourself against radiation exposure, you must be familiar with the different types of nuclear explosions and know how to protect yourself during nuclear attacks. Additionally, you should be familiar with the kinds of equipment that are available for your protection.

SELF PROTECTION

The important point to remember is that in a nuclear explosion, you would adhere to the same protective measures that you would follow in an ordinary bomb explosion. Speed in taking cover is vital, for you must protect yourself from the heat and blast. Remember that the initial radiation after an explosion can be very dangerous. Fortunately, these initial rays are gone 10 seconds after the bomb explodes. If you take cover for a minute or two, you should escape harm unless the explosion occurs very close to you. As with any explosion, the more material or distance between you and the burst, the safer you are. Falling flat and covering your face is better than standing. As is true with protection from all the dangers of war, you must make the most of what you have available. Your training for protection against small arms or artillery fire is also good training for protection against nuclear bombs.

PROTECTIVE EQUIPMENT

Any type of clothing that covers you gives some protection against radiological weapons. To protect the clothes you are wearing from radioactive materials, an extra protective covering is recommended. For example, if you are caught in the open, try to grab something to cover yourself when you fall to the ground. A board or sheets of newspaper will help, but your raincoat is better. Light-colored material will offer better protection against the heat effects. The object is, of course, to keep radioactive dust off your body and regular clothing.

When you enter a "hot" area, you must wear gloves to protect your hands. Touching radioactive material with bare hands may result in serious burns. Any kind of gloves will protect your hands. Later when you wash your hands, it will be easier to decontaminate them, especially your fingernails, if you have worn gloves. Your protective mask or dust respirator should be worn in a "hot" area to prevent the inhalation of radioactive material. The point to remember is never to inhale radioactive material as serious injury and radiation sickness may result.

DECONTAMINATION

If you suspect that you are contaminated, or if detection equipment indicates that you are, report to a personnel decontamination station as directed. Outer clothing will serve as a trap for most radioactive contamination. By taking off your clothes, you may remove most of the contamination.

Upon reporting to the personnel decontamination station, follow the directions of the staff operating the station. If decontaminating personnel are not available, the necessary instructions will be posted on signs. Obey them to the letter.

The usual procedure at the personnel decontamination station is as follows: Discard clothing and equipment as directed. Enter the shower and bathe, using plenty of soap and warm water. In scrubbing the entire body, give particular attention to the hair, fingernails, body creases, and ears. It is at these points that dirt, probably contaminated dirt, tends to gather. After the shower, you will be directed to a monitor who will check you with a radiation detector. If any contamination remains, you must shower again. If no contamination is detected, you may proceed to the dressing room for a new issue of clothing and equipment. Remember that bathing with soap and warm water is the best way to remove radioactive contamination from your body. No special cleaning compound is necessary.

Since food and water are especially subject to contamination, avoid consuming uncovered food or water if they are in a radioactive area. Canned foods and covered water supplies may be consumed with safety, after the outside of the containers are decontaminated. You must rely on trained personnel to check and declare harmless anything you take into your mouth.

Self-Aid

If the tactical situation does not permit you to go to a decontamination station, you must be able to remove most of the radioactive material with whatever you have on hand. If you become heavily contaminated, the following measures are recommended:

1. You must remove your outer garments. Shake them vigorously or brush them off. Be sure that the clothing is held downwind. This will remove most of the radioactive material, unless it is wet and muddy.
2. If it is too cold or wet to remove your outer clothing, brush or scrape them carefully.
3. The same procedure should be used to decontaminate your equipment.

TREATMENT OF CASUALTIES

In the case of an air burst explosion, you may administer first aid to those casualties who

received injuries from a nuclear explosion without the fear of becoming contaminated by the casualties. If the weapon has been detonated close to the ground, both you and the casualty may have some radioactive fallout on your skin and clothing. Your unit CBR personnel can tell you whether or not the amount is serious. Most of it can be removed by simply dusting and shaking your clothes. You must treat for hemorrhage, shock, wounds, fractures, burns, and other injuries. These are by far the more important effects of the bomb. Those personnel who have received only radiation injury will not require first aid treatment, since the only symptoms they will exhibit are vomiting and diarrhea, which will not occur immediately.

CHAPTER 9

POISONING

Each year in the United States, there are thousands of deaths from suicide or accidental poisonings. In addition to the fatalities, approximately 1 million cases of nonfatal poisoning occur because of exposure to substances in every day use such as medicines, industrial chemicals, cleaning agents, and plant and insect sprays.

The Navy's Safety and Hazardous Waste Management Programs require that Material Safety Data Sheets (MSDS) be readily available to all personnel working with hazardous/toxic materials. MSDSs should be consulted for accidents in the workplace to help rapidly identify the material in use and for appropriate first aid response. However, if the information is not immediately available begin treatment of the emergency as described below.

The United States Public Health Service maintains a clearinghouse for information about all types of poisons. It also identifies the poisonous ingredients in all kinds of commercial products. This information is exchanged with poison control centers at medical facilities throughout the country.

Most poisons act rapidly, requiring emergency first aid. Treatment by a physician or assistance from a poison control center should also be obtained immediately. If more than one person is present, one should obtain assistance while the other begins administering aid to the victim. Although the symptoms of poisoning may disappear completely before professional help is obtained, the poison may have harmful or fatal aftereffects.

A poison can be in a solid, liquid, or gaseous state. Poisoning should be suspected whenever a sudden unexplained illness develops. The immediate area should be searched for evidence of the cause. Clues such as gases, or other chemical odors may be present. Leftover food, drinking glasses, containers, or bottles may also provide clues.

Poisons can be ingested (swallowed), inhaled, absorbed, or injected into the body. The routes of entry, together with the types of poisons cause different symptoms and require different methods of treatment.

INGESTED POISONS

Identifying ingested poisons is difficult because there are so many different possibilities. Some poisons can be fatal in minute amounts, while many substances that are medicinal in small amounts become fatal if taken in large doses. Poisoning can result from improperly stored foods, from household products, or from commercial substances used aboard ship. In short, if you suspect poisoning, do not waste time trying to find the cause or the antidote, for poisoning is an emergency situation.

TREATMENT

The latest authorities suggest steps that are easy to remember and that are successful - if success is measured by the number of lives saved.

The first step to remember is to dilute the poison as quickly as possible. Whatever the poison may be, dilute it with water or milk. Give the victim a glass, or two, of milk or water to drink. However, there are some exceptions which are as follows: (1) If the victim is unconscious, do not try to force the fluids down his throat - you can cause him to choke. When treating an unconscious person, you must keep the airway open and give the victim artificial respiration or CPR if necessary. (2) If the victim is having convulsions, do not attempt to make him drink. (3) If the victim becomes nauseous, do not continue diluting - he may vomit on you. But worse, you may do him greater harm, especially in the case of poisoning from corrosive or petroleum substances.

Do not attempt to neutralize the poison. You may have been told to use vinegar, lemon juice, or olive oil to neutralize a specific poison. Forget it! Those things may actually cause greater harm. And did you ever hear about the Universal Antidote? It is not even considered an antidote anymore. It is no longer used because its ingredients inactivate each other. In addition,

although the manufacturer's labels on some potentially poisonous products give directions and antidotes, they are not always correct. A good rule to remember is do not give any antidote without a physician's advice.

You must seek medical help immediately. If the poisoning occurred on board a naval vessel or shore station, you are probably close to medical help. Get it! Do not waste time. Even at home, you will generally be able to get to a medical facility quickly. If there are two people present, one can call the local poison control center or medical facility while the other begins giving the victim water or milk to drink. Also, if you know the cause of poisoning, save the container label. And if the victim vomits, save a sample of the vomited matter.

If for some reason you cannot get medical assistance, induce vomiting. To induce vomiting, give the victim 1 tablespoon of syrup of ipecac in a glass of water. If you do not have syrup of ipecac, induce vomiting by tickling the back of the victim's throat with a finger or some blunt object. However, there are some exceptions that you must consider. (1) Do not induce vomiting if the victim is unconscious, convulsing, or extremely weak. He may die as a result. (2) Also, do not induce vomiting if the victim has ingested a corrosive poison or a petroleum product.

CORROSIVE AND PETROLEUM PRODUCT POISONING

Corrosive poisons fall into the categories of acids, phenols, and alkalies. Examples of corrosive agent and sources of contact are listed in table 9-1. You can suspect that a victim has

Table 9-1.—Sources of Corrosive Agents

AGENT	SOURCES OF CONTACT
ACIDS	
Hydrochloric	Electroplating, metal cleaners, photoengraving
Nitric	Industrial cleaners, laboratories, photoengraving, rocket fuels
Oxalic	Cleaning solutions, paint and rust removers, photo developer
Sulphuric	Auto batteries, detergents, dyes, laboratories, metal cleaners
ALKALIES	
Ammonia	Galvanizers, household cleaners, laboratories, pesticides, rocket fuel
Lime	Brick masonry, cement, electroplating, insecticides, soap, water treatment
Lye	Bleaches, degreasers, detergents, laboratories, paint and varnish removers
PHENOLS	
Carbolic	Disinfectants, dry batteries, paint removers, photo materials, wood preservers
Creosole	Disinfectants, ink, paint and varnish removers, photo developer, stainers
Creosote	Asbestos, carpentry, diesel engines, electrical shops, furnaces, lens grinders, painters, water proofing, wood preservers

ingested a corrosive poison if there are chemical burns around the mouth and lips. Petroleum products include kerosene, gasoline, and turpentine. Petroleum product poisoning is characterized by a smell of kerosene or gasoline on the victim's breath.

In the case of corrosive poisoning, treatment involves diluting the poison, preferably with milk, and calling for medical advice. However, do not induce vomiting and do not give the victim charcoal.

To treat petroleum product poisoning, get the advice of a physician or poison control center. If you cannot get professional advice, dilute with water - do not induce vomiting.

SHELLFISH AND FISH POISONING

Mussels, clams, oysters, and other shellfish, while unpredictable, are more often poisonous during the warm months of March to November. There are numerous varieties of shellfish that should not be eaten at all; therefore, wherever you serve in the world, learn which kind of seafood is known to be safe.

Most fish poisoning occurs from fish that are normally considered safe but become poisonous at different times during the year. Fish poisoning is also caused by eating poisonous algae and plankton (red tide) that appear in certain locations. Examples of fish that are always poisonous are shown in figure 9-1.

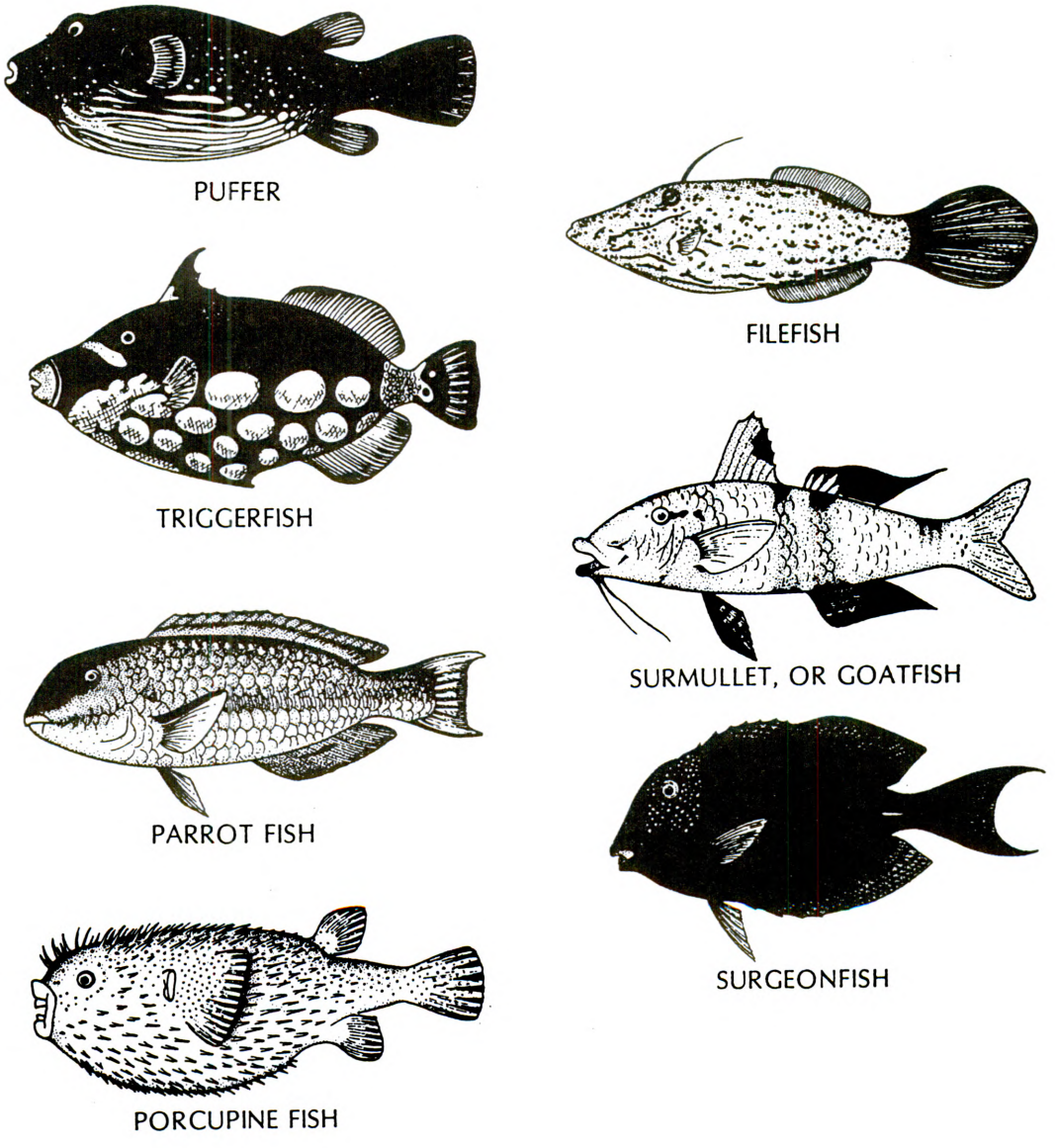


Figure 9-1.—Poisonous fish.

The symptoms of shellfish and fish poisoning are as follows:

1. Tingling and numbness of the face and mouth
2. Muscular weakness
3. Nausea and vomiting
4. Increased salivation
5. Difficulty swallowing
6. Respiratory failure

If the victim has not vomited, cause him to do so. If he develops respiratory failure, give the victim artificial respiration and treat for shock.

INHALED POISONS

In the Navy, many industrial processes are carried out. The problem of poisoning by inhalation is widespread. The handling of large quantities of petroleum products - fuel, oil, and gasoline in particular - constitutes special hazards, since all of these products give off poisonous vapors.

Other poisonous gases are by-products of certain processes that include exhaust gases from internal combustion engines; fumes or vapors from materials used in casting, molding, welding, and plating; gases associated with bacterial decomposition in closed spaces; and gases that accumulate in voids, double bottoms, empty fuel tanks, and similar spaces.

Inhalation poisoning causes shortness of breath and coughing. This will cause the victim's skin to turn blue. If respiratory problems are not corrected, cardiac arrest may follow.

In treating an inhalation poisoning victim, remove the person from the toxic atmosphere immediately. WARNING: Never try to remove a victim from a toxic environment if you do not have the proper protective mask or oxygen breathing apparatus and if you are not trained in its use. Too often, well-intentioned rescuers become the victims. When in doubt, call the rescue service. If help is not immediately available and if you KNOW you can reach the victim and effect rescue, take a deep breath, hold it, and pull the victim out. If the victim is not breathing, start artificial respiration. Give oxygen if it is available. Remove contaminated clothing if a chemical warfare agent was the cause of the poisoning. Also, keep the victim quiet and treat him for shock. Do not forget to call for medical assistance.

CARBON MONOXIDE POISONING

Carbon monoxide, a product of incomplete combustion, is probably the most common cause of poisoning by inhalation. It can be severe, prolonged, and sometimes fatal. Carbon monoxide is colorless, tasteless, and practically odorless. It destroys the ability of the red blood cells to carry the needed oxygen to the body tissues. Carbon monoxide is usually the result of faulty equipment, improper use of equipment, or inadequate ventilation. It can be prevented by taking appropriate precautionary measures.

The symptoms of carbon monoxide poisoning appear rapidly and in quick succession. Dizziness, headache, noises in the ears, and throbbing in the temples are quickly followed by a feeling of sleepiness and weakness. Vomiting and convulsions may occur, followed by unconsciousness and death. The skin and lips are often identified by a characteristic cherry red appearance. The individual who is becoming poisoned may realize what is happening, but he may not have enough strength left to get to fresh air. Under those circumstances in which there is muscular exertion or there are extremes of temperature or humidity, the effects of poisoning occur more rapidly.

When giving first aid to a person who is overcome by carbon monoxide poisoning, move the victim into fresh air immediately and administer artificial respiration. It is safe to give mouth-to-mouth respiration to a carbon monoxide poisoning victim. You will not be poisoned unless you try to give resuscitation in the same environment in which the victim succumbed. Also, keep the victim quiet and transport him to a medical treatment facility.

ABSORBED POISONS

Many substances in the form of gases, fumes, mists, liquids, and dusts cause tissue irritation or destruction by contact with the skin, eyes, and lining of the nose, mouth, and throat. To administer first aid to the victim of this kind of contact poisoning, remove the contaminated clothing and flood the area with plenty of water. The person should then be watched for signs of shock and changes in respiration. If the poison has contacted the eyes, wash them with plenty of water.

The sap or juice of certain plants will cause skin eruptions on some persons. The most common of these plants are poison ivy, poison

oak, and poison sumac. These poisonous plants grow as vines or shrubs, waist to shoulder high. The poison comes mainly from their leaves, but it also may come from bruising their roots, stems, or berries. The smoke from burning brush containing these plants has been known to carry the poisons considerable distances.

The signs and symptoms of this kind of skin poisoning most often will appear as a red rash with some swelling, itching, and burning, followed by blisters that may appear from 6 hours to several days after exposure. The blisters may fill with pus or contaminated fluid. When they break, crusts and scabs are formed. Considerable fluid may exude from broken blisters. When the affected area is considerable and the inflammation is severe, there may be fever, headache, and general body weakness.

The first aid for contact with poisonous plants is similar to that for the other contact poisons that are discussed above. Remove the contaminated clothing and wash the area with soap and water. A calamine preparation or a soothing skin lotion can be used if the rash is mild. If a severe reaction appears, seek medical advice.

INJECTED POISONS

Injection of venom by stings and bites from various insects, while not normally life-threatening, can cause an acute allergic reaction that can be fatal. Poisons may also be injected by snakes and marine animals.

SNAKEBITE POISONING

Poisonous snakes are found throughout the world, primarily in the tropical and temperate regions. Within the United States, there are 20 species of poisonous snakes. They can be grouped into two families, the Crotalidae (rattlesnakes, copperheads, and moccasins), and the Elapidae (coral snakes).

Identification

The crotalidae are called pit vipers because of the small, deep pits between the nostrils and the eyes (see figures 9-2). They have two long hollow fangs that are normally folded against the roof of the mouth; these fangs can be extended by a swivel mechanism when they strike. Other identifying features include thick bodies, slitlike pupils of the eyes, and flat triangular heads. Further identification is provided by examining the wound for signs of fang entry in the bite pattern, as shown in figure 9-2. Individual identifying characteristics include audible rattles on the tails of most rattlesnakes and the cotton white interior of the mouths of moccasins. These snakes are found in every state except Maine, Alaska, and Hawaii.

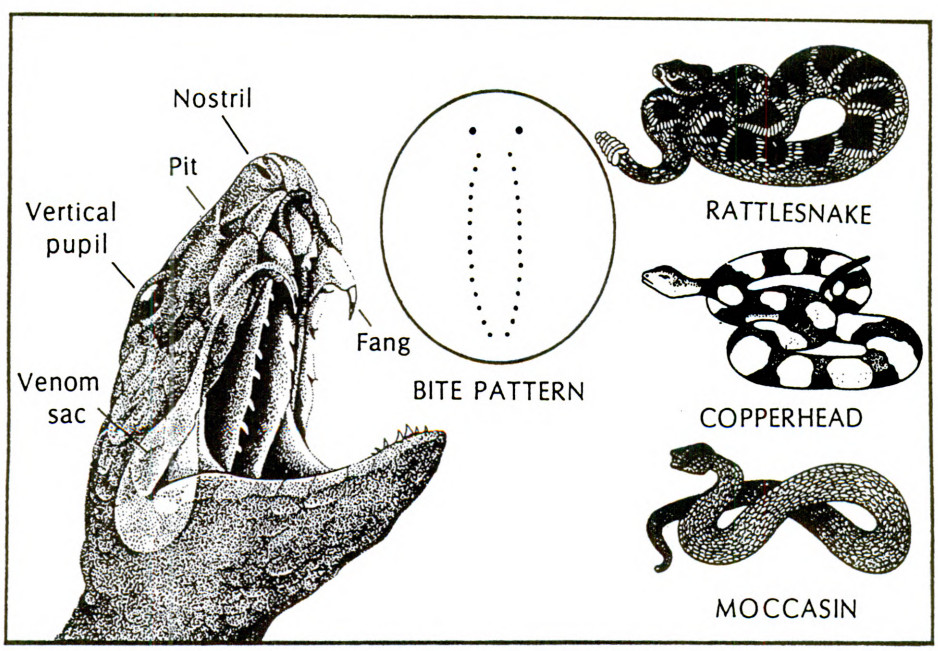


Figure 9-2.—Pit vipers found in the U.S. and their bite pattern.

Coral snakes are related to the cobras, kraits, and mamba snakes in other areas of the world (fig. 9-3). Corals, which are found in the southeastern United States, are comparatively thin snakes with small bands of red, black, and yellow (or almost white). Other nonpoisonous snakes have the same coloring, but in the coral snake, the red band always touches the yellow band. Its short grooved fangs must chew into its victim before the poison can be introduced. The bite pattern is depicted in figure 9-3.

In a snakebite situation, every reasonable effort should be made to kill or at least to positively identify the culprit, since treatment of a nonpoisonous bite is far simpler and less dangerous to the victim than treatment of a poisonous bite.

Venom

Snake venom is a complex mixture of enzymes, peptides, and other substances. A single injection can cause many different toxic effects in many areas of the body. Some of these effects are felt immediately while the action of other venom components may be delayed for hours or even days. A poisonous bite should be considered a true medical emergency until symptoms prove otherwise.

The venom is stored in sacs in the snake's head. It is introduced into a victim through hollow or grooved fangs. An important point to remember, however, is that a bitten patient has not necessarily received a dose of venom. The snake can control whether or not it will release poison and how much it will inject. As a result, while symptoms in a poisonous snakebite incident may be severe, they may also be mild or not develop at all.

Diagnosis

It is essential that you be able to quickly diagnose a snake bite as being envenomated or

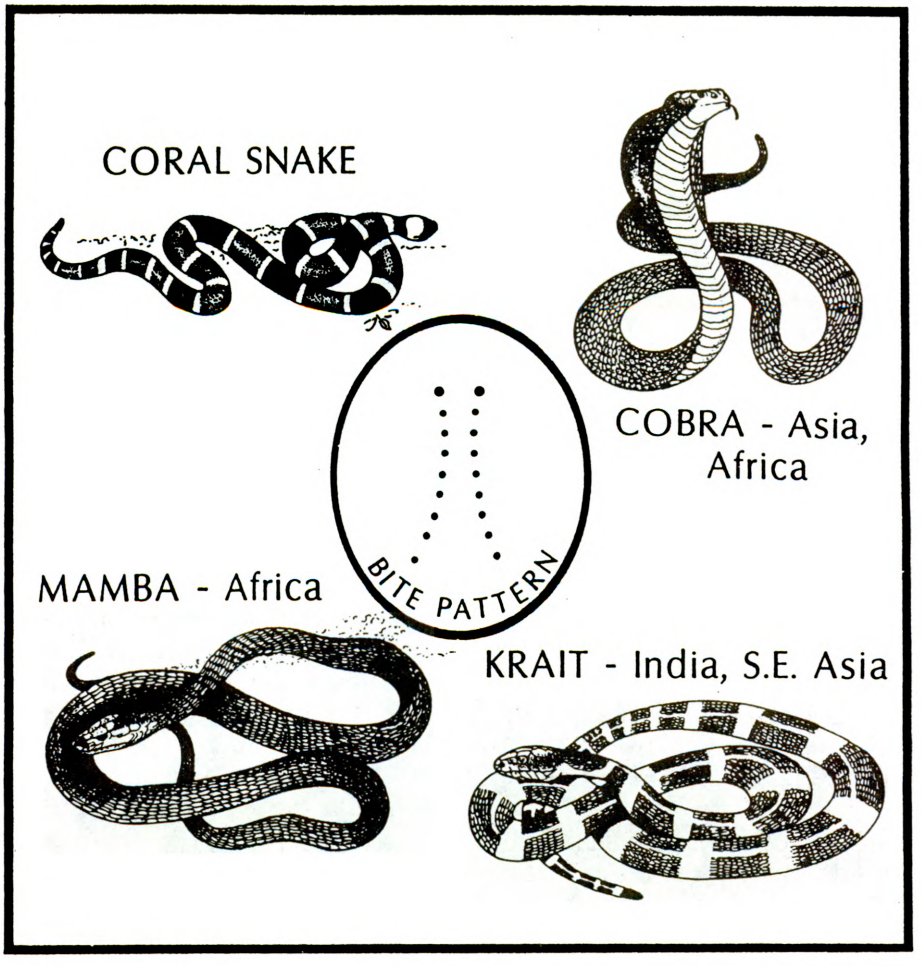


Figure 9-3.—Neurotoxic snakes and their bite patterns.

not. Usually enough symptoms present themselves within an hour of a poisonous snakebite to erase any doubt. The victim's condition provides the best information as to the seriousness of the situation. The bite of the pit viper is extremely painful and is characterized by immediate swelling about the fang marks, usually within 5 to 10 minutes, spreading and possibly involving the whole extremity within an hour. If only minimal swelling occurs within 30 minutes, the bite will almost certainly have been from a nonpoisonous snake, or from a poisonous snake that did not inject venom. When the venom is absorbed, there is a general discoloration of the skin due to the destruction of blood cells. This reaction is followed by blisters and numbness in the affected area. Other signs that may occur are weakness, rapid pulse, nausea, shortness of breath, vomiting, shock, headache, fever, chills, drop in blood pressure, and blurred vision. Severe poisoning can cause lung and internal bleeding. The eastern diamond back rattler bite is further characterized by numbness and tingling in the mouth and possibly involving the face and scalp. A metallic taste on the tongue may be noted.

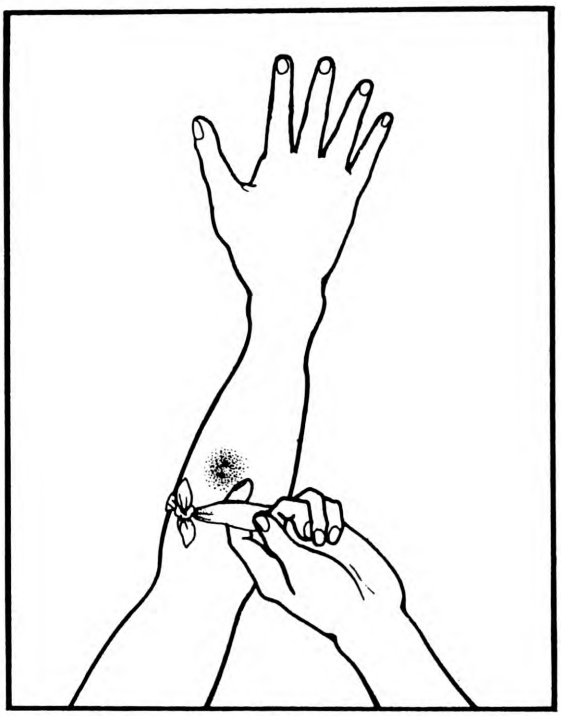


Figure 9-4.—Constricting band properly applied.

Treatment

The aim of first aid for envenomated snakebites is to reduce the circulation of blood through the bite area, to delay absorption of venom, to prevent aggravation of the local wound, to maintain vital signs, and to transport the victim as soon as possible to a medical facility. Other aid will be mainly supportive. Meanwhile, follow these treatment measures:

1. Wrap a constricting band (for example, rubber tubing, belt, necktie, stocking) 2 to 3 inches above the fang marks, or above the nearest joint, but away from the swelling. It should be tight enough to stop the flow of blood in the veins, but not tight enough to shut off the arterial blood supply (figure 9-4). A second constricting band should be placed 2 to 3 inches below the wound. You should be able to feel the victim's pulse below the constricting bands. As swelling progresses, advance the constricting bands to keep ahead of the swelling.

2. If the victim cannot reach a medical facility within 4 or 5 hours, and if there are already definite signs of poisoning, use a sterile knife blade to make an incision about 1/2 inch long and 1/4 inch deep lengthwise over each fang mark. Apply suction cups to help remove some of the injected venom. Suction by mouth is recommended only as a last resort, because the human mouth contains so many different bacteria that the bite could become infected. Incision and suction later than 30 minutes after the victim was bitten is not recommended.

3. Check the pulse and respiration frequently. Give artificial ventilation if necessary.

4. Calm and reassure the victim, who will often be excited or hysterical. Keep the victim lying down, quiet, and warm. Do not give the victim alcohol, or any other stimulant to drink. Do not give aspirin or any medicine containing aspirin.

5. Treat for shock.

6. Use a splint to immobilize the victim's affected extremity, keeping the involved area at or below the level of the heart.

7. Cover the wound to prevent further contamination.

8. Telephone the nearest medical facility so that the proper antivenin can be made available.

9. Transport the victim (and the dead snake) to a medical facility as soon as possible.

The treatment of a nonpoisonous snakebite is essentially the same as the treatment for puncture wounds.

BEE, WASP, AND ANT POISONING

Stings from bees, wasps, and ants account for more poisonings than any other insect group. Fortunately, their stings rarely result in death. The vast majority of stings cause a minor local reaction of pain, redness, itching, and swelling at the injection site. These symptoms usually fade after a short period.

Approximately 5 percent of the stings and bites cause severe or allergic reactions such as itching, swelling, weakness, headache, difficulty in breathing, and abdominal cramps. Shock may follow quickly and death may occur.

Emergency care for bites and stings depends upon the individual's reaction.

If the victim is stung by a bee or other insect, remove the stinger immediately by scraping it off gently with a sharp object such as a knife blade, the side of a tweezers, or the fingernail. Do not try to grasp the sac or stinger since this may force the remaining venom into the skin. Clean the wound and surrounding area, and apply cold packs to slow the absorption of the poison and to relieve pain. Never cut spider and scorpion bites.

All other treatment for stings and insect bites should be the same as that discussed under "Snakebite Poisoning."

SPIDER AND SCORPION POISONING

Spiders in the United States are generally harmless, with several exceptions. The most notable are the black widow and the brown recluse spiders. Their bites are serious but rarely fatal.

The black widow spider is a moderately large, glossy spider with very fine hairs over the body giving it a silky appearance. It has a distinctive hourglass-shaped red spot on its belly. See figure 9-5. The bite causes immediate pain that spreads quickly from the region of the bite to the muscles of the back, shoulders, chest, abdomen, and limbs. The pain is usually accompanied by severe spasms of the abdominal muscles. Nausea, vomiting, sweating, and difficulty in breathing are frequently present.

The brown recluse spider is identified by the violin marking on its back (figure 9-5). It injects a venom that causes a limited destruction of red blood cells and certain other blood changes. The victim may develop chills, fever, joint pains, nausea, and vomiting. A generalized rash may also develop within 24 to 48 hours.

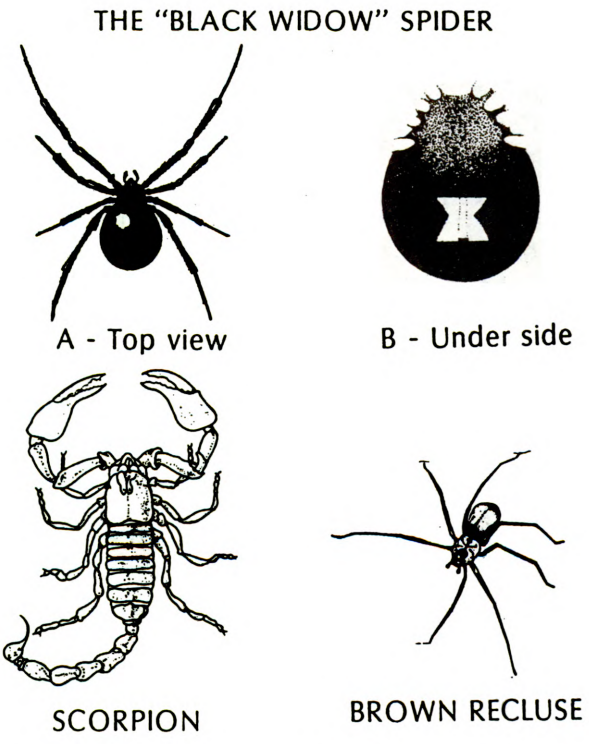


Figure 9-5.—Black widow and brown recluse spiders and a scorpion.

Most scorpion stings in the United States are not usually harmful, with the exception of a variety found in the southwest. The majority of scorpion stings produce a burning sensation at the site of the bite, followed by pain that spreads to the entire limb. Skin discoloration may be present. Stings from the more dangerous species (Southwestern United States, Africa, Asia, and South America) produce nausea, vomiting, convulsions, abdominal pain, excessive salivation, and shock. The victim may develop respiratory failure, heart failure, coma, and die. Consult the section on "Bee, Wasp, and Ant Poisoning" for treatment measures.

MARINE LIFE ANIMAL POISONING

A number of sea animals are capable of inflicting very painful wounds by biting, stinging, or puncturing. Except under rare circumstances, stings and puncture wounds are not fatal. Major wounds from sharks, barracudas, moray eels, and alligators can be treated by controlling the bleeding, preventing shock, giving basic life support, splinting the injury, and securing prompt medical aid. Minor injuries inflicted by turtles and

stinging corals require only that the wound be cleansed and the injury splinted.

Other sea animals inflict injury by means of stinging cells located in tentacles. This group includes the jellyfish, Portuguese man-of-war (figure 9-6), anemones, corals, and hydras. Contact with the tentacles produces burning pain, a rash with small hemorrhages in the skin, and, occasionally, shock, muscular cramping, nausea, vomiting, and respiratory distress. Treatment consists of gently removing the clinging tentacles with a towel and washing the area thoroughly with diluted ammonia, rubbing alcohol, or monosodium glutamate. If symptoms become severe, seek medical advice.

Spiny fish, stingrays, urchins, and cone shells inject their venom by puncturing with spines (figure 9-7). General signs and symptoms include swelling, nausea, vomiting, generalized cramps, diarrhea, muscular paralysis, and shock. Deaths are rare. Emergency care consists of soaking the wounds in hot water 30 to 60 minutes, controlling the bleeding, applying a dressing, and obtaining medical assistance. The stinger of the stingray is barbed and should not be removed. The site of injury should be protected from movement so that the stinger will not be forced in deeper. The stinger must be removed by a physician. In the case of sea urchins, spiny fragments may be removed after a hot water soak.

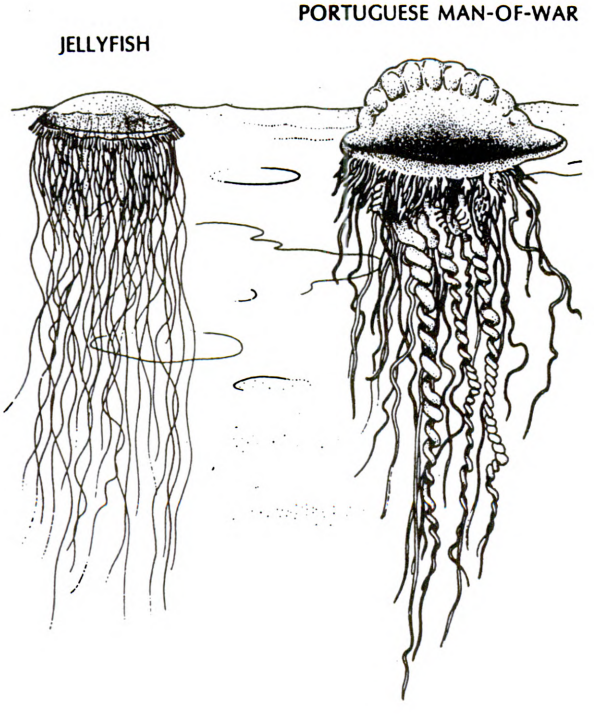


Figure 9-6.—Stinging sea animals.

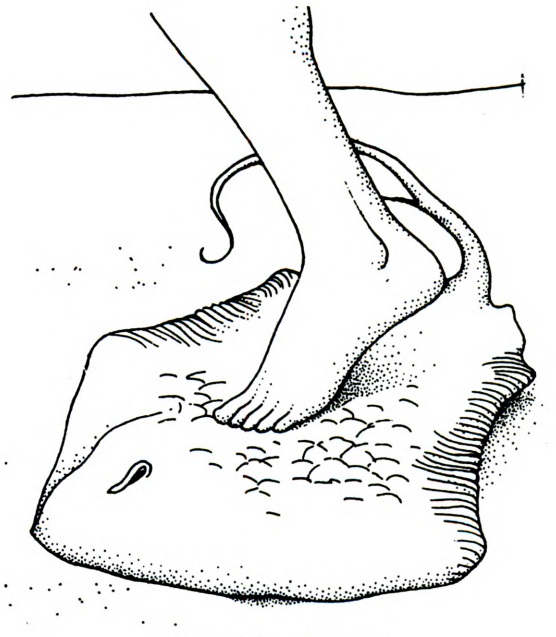


Figure 9-7.—Stingray.

Sea snakes are found in the warm water areas of the Pacific and Indian Oceans. Their venom is very poisonous, but their fangs are only 1/4 inch long. Follow the same treatment for sea snakebite as discussed under "Snakebite Poisoning."

HUMAN AND LAND ANIMAL POISONING

Wounds may also be caused by human or land animal bites. Such wounds are often torn, lacerated, and bruised. Human bites that break the skin may become seriously infected, since the mouth is heavily contaminated with bacteria. All human bites must be treated by a physician.

Animal bites, whether domestic (for example, dogs and cats) or wild (for example, bats, raccoons, and rats) always present the possibility of rabies in addition to tissue injury and infection. If at all possible, the animal inflicting the injury should be captured and impounded so it can be observed for signs of rabies. If killing is necessary, do not damage the animal's head, since it is necessary to examine the brain.

In treating human or animal bites, first cleanse the wound thoroughly with soap or a detergent solution. Flush it well with running water. Then cover the wound with a sterile dressing. Immobilize the injured extremity. Finally, transport the victim to a medical treatment facility immediately.

CHAPTER 10

COMMON MEDICAL EMERGENCIES

This chapter will examine briefly some common medical emergencies that are not covered elsewhere in this text. Obviously, many more conditions could have been included in addition to what follows, but a limit had to be established. Therefore, this chapter discusses only those emergency conditions that you are most likely to encounter.

MEDIC-ALERT IDENTIFICATION

Many persons wear a MEDIC-ALERT symbol, which is shown in figure 10-1, for emergency medical identification. This is sometimes worn as a bracelet or necklace, or it may be carried as a card in the purse or wallet. This MEDIC-ALERT symbol is worn to identify special medical problems such as diabetes, epilepsy, or acute allergic reactions. When you are involved in an emergency situation, always check the victim's wallet, clothing, wrist, or neck for an emergency medical identification card or tag.

UNCONSCIOUSNESS

Unconsciousness means the victim is completely unaware of what is going on around him and is unable to make purposeful movements. Sleep is the only normal unconscious state. Fainting is a brief period of unconsciousness while coma is a prolonged unconsciousness. Stupor is a partial, transient state of unconsciousness. The most common causes of abnormal unconsciousness are cerebral vascular accident (stroke), head injury, heat stroke, poisoning, epilepsy (seizure disorder), and alcoholism or drug abuse. Acute alcoholic intoxication or drug overdose can suppress respiration and cause death. Often the cause of unconsciousness is not apparent. If the cause of unconsciousness cannot be determined, the following actions should be taken. If the victim is pale, keep him lying down, with his head level with or slightly lower than his feet. Keep him warm but do not overheat him. If the victim is flushed, keep him lying down, with his head and shoulders slightly raised. Apply cold compresses to his head. If the victim is vomiting, turn the head to one side to prevent choking.

Figure 10-1.—Medic-alert symbol.

If the victim has merely fainted, he will regain consciousness within a few minutes. If an ammonia inhalant is available, break the ampule and place it near the victim's nose several times for a few seconds each time. If he is in a sitting position, lay him down gently. Loosen his clothing, apply a cold wet cloth to his face, and let him lie quietly. Any time a person is about to faint while sitting up, lower his head between his knees so that blood may flow to his head. Hold him so that he does not fall and injure himself.

DIABETIC COMA

When a diabetic person is unable to obtain the insulin necessary to fully burn and use fats and carbohydrates, the body's chemical balance is seriously affected, resulting in a condition known as acidosis. If acidosis is severe, the person may ultimately lapse into a coma.

Care must be taken not to confuse the signs and symptoms of diabetic coma with alcohol

intoxication. In diabetic coma, the victim's face is flushed, the skin is dry, the lips are cherry red, and he appears listless and drowsy. The victim is often very thirsty but not hungry, and nausea or vomiting may be present. There is a characteristic sickly sweet odor of nail polish remover on his breath.

In treating a person in diabetic coma, medical assistance must be summoned immediately. If the person has his or her own insulin, give it. Do not give any medications or insulin other than the individual's own insulin. If medical assistance will be delayed and insulin is not available, treat the victim for shock and, if conscious, give him large amounts of water. NOTE: Since many people in diabetic coma tend to vomit, the victim must be protected from inhaling the vomited material into his lungs. To do this, ensure that his head is turned to one side.

INSULIN SHOCK

Insulin shock, also called hypoglycemia, occurs if there is too little sugar in the blood as a result of too much insulin. The signs and symptoms include cool, moist, clammy skin, pale complexion (ashen color), a rapid or normal full pulse, hunger, and slow but shallow respirations. It should be noted that insulin shock victims do not have a characteristic breath odor.

Because insulin shock is a condition where there is an insufficient amount of sugar in the blood, treatment revolves around increasing the blood sugar. Conscious victims may be give fruit juice with sugar, or sugar in any available form. Small amounts of sugar probably will not reverse insulin shock; an entire candy bar or glass of juice is often necessary. Do not be afraid of giving too much sugar. Do not give sugar-free drinks sweetened with saccharin.

Because an unconscious person cannot swallow, do not attempt to give him anything by mouth. In the past, it was recommended that sugar be placed under the victim's tongue. Recent studies have indicated that very little sugar is absorbed in this manner and that the risk of choking or aspirating probably outweighs the benefit. However, if transportation to a medical facility will be delayed or prolonged, this method may be used.

If there is any doubt of whether the victim is in insulin shock or diabetic coma, give sugar. The reason for this is that untreated insulin shock can quickly result in unconsciousness and can quickly cause brain damage or death; diabetic coma is much less rapid in its damage. Giving sugar can possibly save a life or prevent brain damage. If the victim is in diabetic coma, giving sugar will not appreciably affect the condition. In any event, the victim in diabetic coma or insulin shock must be seen at a medical treatment facility as soon as possible.

STROKE

This condition, also called apoplexy, is caused by any interruption of blood supply to the brain that lasts long enough to damage the brain. The brain requires a continuous supply of oxygen and sugar which is delivered by a continuous flow of blood to all parts of the brain. If the flow is interrupted for more than 4 to 6 minutes, irreversible brain damage can occur. Interruption is caused by a narrowing of the vessels, a rupture of a vessel, or a clot that lodges in a vessel (thrombosis).

Since specific areas of the brain control specific functions, signs and symptoms may vary with the location and extent of damage. Strokes may produce the following effects:

1. Partial or complete paralysis of one side of the body including loss of facial expression; rarely are both sides affected.
2. Diminished consciousness ranging from coma to confusion or dizziness.
3. Difficulty with speech or vision.
4. Convulsions.
5. Difficulty with swallowing or breathing.
6. Headache only.

Although brain damage may be extensive following a stroke, victims usually do not die. Most gradually improve and experience significant return of function. Emergency treatment is based on supporting vital functions and transporting to a medical treatment facility. Therefore, send for medical aid at once. Place the victim in a semi-reclining position or laying down on the affected side and apply cool compresses to his head. Loosen his clothing and keep him warm but not overheated. Watch closely for signs of breathing difficulties due to aspiration of excessive saliva or vomited material. The stroke victim should not be given anything by mouth, because the throat muscles may be paralyzed. Even the conscious person may be unable to swallow.

HEART ATTACK

The heart is a muscular organ whose major function is to pump blood to various parts of the body, including itself. In order to carry out its pumping function, the heart muscle must have a continuous supply of oxygen and nutrients. This supply is furnished through the coronary arteries that supply blood to the heart muscle. In some cases, the coronary vessels become partially or completely occluded. When this occurs, sufficient blood cannot pass through the vessels to supply the oxygen and nutrients required by the heart.

If the heart does not have enough oxygen to meet its needs for more than several seconds, severe chest pain will result. This pain is characteristically "crushing"—it takes your breath away. Some people describe it as "squeezing" or "like somebody is standing on my chest." The pain is usually felt under the sternum (breastbone) and can radiate to the jaw, the arms, or into the upper abdominal area. This type of pain is indicative of one of two conditions: angina pectoris or a heart attack.

The distinguishing characteristics between angina and a heart attack is that angina pain occurs with exertion or stress and is relieved in a few minutes with rest or relief of stress and nitroglycerin tablets. With a heart attack, the pain lasts much longer, may occur at any time, and is not relieved by rest or nitroglycerin. Additionally, the heart attack victim may be pale, have profuse sweating, and may collapse and lose consciousness.

When treating a heart attack victim, the primary objective is to reduce or relieve stress on the heart muscle. Keep the victim lying on his back, with the head and shoulders elevated. If the victim can tolerate it, a half-sitting position is better. Loosen all clothing to allow unrestricted breathing. Allow no smoking by the victim or those close by. Give oxygen if it is available. Keep the victim quiet and reassure him. Heart attack victims become very anxious. If the victim's heart stops beating, initiate cardiopulmonary resuscitation (CPR) immediately.

ANAPHYLACTIC REACTION

This condition, also called anaphylaxis or anaphylactic shock, is a severe allergic reaction to foreign material. Penicillin and toxin from bee stings are probably the most common causative agents, although foods, inhalants, and contact substances can also initiate a reaction. Anaphylaxis can occur at any time, even to people who have taken penicillin many times before without experiencing any problems. This condition progresses to severe shock and cardiopulmonary failure. Death may occur if immediate first aid is not administered.

The most characteristic and serious symptoms are tightening of the voice box, loss of voice, and difficulty in breathing, particularly exhaling. Other typical signs are giant hives, coughing, and wheezing. Symptoms and signs of shock may develop, and the victim may die of respiratory failure.

The first aid management of the victim in anaphylactic shock consists of maintaining vital life functions. Maintain an open airway, and ensure adequate breathing and pumping action of the heart. The victim of an anaphylactic reaction requires the immediate assistance of medical personnel.

Many persons with a known sensitivity to bees, food, or pollens have medication to take when an allergic reaction occurs. Often, these medications come in commercially prepared kits that contain injectable medications and pills with instructions on how to use each. If the victim is having a severe reaction or his condition is getting worse, follow the instructions and administer the medication.

CONVULSIVE SEIZURES

Convulsions, seizures, and fits are common names for a condition that is always alarming but not necessarily serious, thus it is important to stay calm. Convulsive seizures may be caused by epilepsy, drugs, poisoning, brain tumors, low blood sugar, and severe alcoholism, but they rarely result in death. Therefore, the first aid provider has time to administer effective care.

Most seizure victims present with the following signs and symptoms. After a period of extreme restlessness and irritability, there is partial or total loss of consciousness. There are also some involuntary muscular movements, such as jerking, thrashing, and twitching, which may continue from minutes to hours, depending on the nature and the cause of the seizure. Toward the end of the seizure, the victim falls into a deep sleep or quiet stupor. Although death rarely occurs because of the seizure itself, victims can die as a result of a sudden fall, burn, or injury incurred during the seizure.

The major goal of treating a seizure victim is to protect him from injuring himself. Put a folded cloth or padded object between his teeth to prevent him from biting his tongue. If his teeth are closed tight, DO NOT attempt to pry them open. Pillows, blankets, or rugs should be placed under his head and around his body to protect it from traumatic injury. Constricting clothing, such as ties and belts, should be loosened. No attempt should be made to hold down a convulsing victim. All efforts should be directed toward preventing injuries. Since the tongue of the victim has a tendency to fall to the back of the throat during the attack, the first aid provider must ensure that breathing remains adequate. If breathing stops for longer than one minute, mouth-to-mouth respiration must be started immediately. When the seizure victim passes into the deep sleep phase, no attempt should be made to disturb him. Ultimately, medical attention must be provided.

ALCOHOL INTOXICATION

Acute alcoholic intoxication is not an unusual condition and only rarely is arrived at by accident, unless a lack of judgement on the part of the consumer of alcohol can be considered accidental. Frequently, a situation arises in which a person with alcohol intoxication requires first aid care and sometimes medical assistance.

The signs and symptoms of alcohol intoxication are too well known to require mentioning. However, if the alcohol in the blood has reached toxic levels, a fatal outcome is possible, and very definite treatment is required.

Induce vomiting, even if the victim has already vomited, in order to empty his stomach, and wash it out further with a solution of salt water (about 1 teaspoon of salt to a glass of water) to get rid of any remaining alcohol and to soothe the inflamed lining of the stomach. Follow this step with a large dose of Epsom salt or other saline laxative to purge the intestines. Remember, however, that you never induce vomiting or give anything by mouth to an unconscious person. If unconscious, the victim should be positioned on his side to prevent aspiration. The most common cause of death in alcohol intoxicated service members (other than accidents) is aspiration.

Treat the victim for shock, and keep him warm and out of drafts, because pneumonia develops often in alcoholics. If the intoxication is severe, the victim should be seen by medical personnel.

It must be emphasized that the person who is under the influence of alcohol must be observed carefully and provided care, if necessary. If he is conscious, he will undoubtedly resist your efforts to assist him. Great tact is essential in dealing with these cases. Under no circumstances let an intoxicated person convince you that he is "perfectly all right." See the section on "Alcohol" in chapter 12.

DELIRIUM

Delirium is a condition of brain malfunction that stops short of unconsciousness. It may arise because of high fever, a head injury, head infections, pneumonia, chest wounds, severe burns with fluid loss, severe pain, poisoning by chemical agents, drug intoxication or withdrawal, and numerous other medical conditions. The victim may eventually lose consciousness.

The delirious victim is periodically confused as to where he is, who he is, what day it is, and what he is supposed to be doing. His memory for what happened only 2 minutes before is poor. He may be extremely restless, anxious, and panicky; or he may be more quiet and withdrawn than usual. If he is restless, he may hallucinate or believe others will harm him. His speech may be slurred, and his thoughts are difficult to understand. The delirious victim must be approached in a calm, confident manner. If you show fear, he will be convinced danger surrounds him and may strike out. Explain to the victim who he is, where he is, and what has happened to him.

Keep the victim's attention focused on you, away from his own imagination. With the help of friends, get him to a quiet place; if he has a weapon, disarm him. A buddy must stay with him until he is evacuated, as he cannot be trusted to think clearly and may injure himself or others. Delirium, like unconsciousness, is a medical signal that the brain is not working well; it requires prompt medical attention.

DROWNING

Drowning occurs when a victim is unable to breathe air due to submersion in water or any other fluid which causes spasm of the vocal cords and blockage of the airway. Many victims who appear lifeless may recover if artificial ventilation is performed promptly and efficiently. Speed is essential. Every moment of delay decreases the

victim's chance of survival. It is frequently possible to start mouth-to-mouth ventilation before the victim is brought ashore. As soon as his head is clear of the water and his mouth is within reach of your mouth, start artificial ventilation. If other rescuers can help carry the victim ashore, do not interrupt artificial ventilation. Once the victim is ashore, do not waste valuable seconds attempting to drain water from his lungs, but continue artificial ventilation. Remember that an apparently lifeless person who has been immersed in cold water for a long time may still be revived by artificial ventilation.

ELECTRIC SHOCK

Electric shock injuries frequently result from contact with a "live" wire and occasionally occur when a person is struck by lightning. If a person has come in contact with an electric current, take the following steps:

1. Turn off the switch if it is nearby, but do not waste time looking for it. Instead, use a dry wooden pole, dry clothing, dry rope, or some other material that will not conduct electricity to remove the person from the wire. Do not touch the wire or the victim with your bare hands, or you may be the second victim.
2. Administer artificial ventilation immediately after freeing the person from the wire if the electrical shock caused breathing to cease. Check the victim's pulse, since electric shock may also cause his heart to stop. If you do not feel a pulse immediately, administer closed-chest heart massage with artificial ventilation (CPR).

FOREIGN BODIES

Foreign objects can become lodged in any orifice of the body: the eyes, nose, ears, mouth, stomach, rectum, under the skin. In many cases, removal is simple; in others, medical attention is needed.

FOREIGN BODIES IN THE EYES

Foreign bodies, such as particles of dirt, sand, paint chips, or fine pieces of metal, frequently seem to find their way into someone's eyes. They not only cause discomfort, but if not removed, they can cause inflammation and possibly infection. Fortunately, through an increased flow of tears, nature dislodges many of these substances before any harm is done. In no case should the eye be rubbed, since rubbing may cause scratches to the delicate tissues or force a foreign particle with sharp edges into the tissues, making removal difficult. It is always much safer to send the person to sickbay than for the first aid provider to attempt to remove foreign bodies.

The first thing that the first aid provider should do for a foreign body in the eye is to flush the eye with water for at least 15 minutes. If flushing the eye is not successful in removal of the foreign body, you will need to examine the eye and posterior eyelids. Never attempt to remove an object that is on or in the eyeball itself. The lower lid can be examined by placing two fingertips on the cheekbone and pulling down gently on the lower lid. It is a little more difficult to examine the back of the upper lid. Have the victim look down; grasp the eyelashes of the upper lid while you place a cotton swab or similar object against the upper portion of the lid. You should then be able to evert (turn inside out) the lid for examination (see figure 10-2). The particle should be removed gently with a moistened cotton swab or a clean improvised swab such as the corner of a cleanly laundered handkerchief.

Should a foreign body become lodged in the eyeball, do not attempt to remove it, as it may be forced deeper into the eye and result in further

Figure 10-2.—Turning the upper eyelid over a wooden applicator.

damage. Place a bandage compress over both eyes. Take the victim to sickbay. Removal of particles embedded in the eyeball requires skill.

FOREIGN BODIES IN THE NOSE

Foreign bodies in the nose usually can be removed without difficulty but may occasionally require medical aid.

Sneezing induced by sniffing snuff or pepper, or tickling the opposite nostril with a feather, usually will dislodge a foreign body in the nose.

Do not blow the nose violently or with one nostril held shut. Do not attempt to hook the foreign body with a hairpin or similar object because damage may be done to the tissues of the nasal cavity, or the foreign body may be pushed into an inaccessible place.

SWALLOWED OBJECTS

Foreign bodies such as pins, coins, nails, and other objects are sometimes swallowed accidentally. Except for pins, nails, or other sharp objects, swallowed foreign bodies usually cause no great harm. One who has accidentally swallowed a potentially dangerous foreign object should not take anything to induce vomiting or bowel movement. A medical officer should be consulted.

FOREIGN OBJECTS IN THE EAR

Small insects, pieces of rock, or other material may become lodged in the ear. Do not insert pins, matchsticks, pieces of wire or other objects in the ear to dislodge foreign bodies because these objects may damage the tissue lining the ear or perforate the ear drum. Also, do not attempt to flush it out with water; some objects may absorb water and swell causing damage.

In the case of insects, if it is alive, shining a flashlight into the ear may attract the insect and cause it to fly out. If the light does not produce results, turn the patient's head to the side, and put several drops of warm olive oil, mineral oil, or baby oil in the ear. Then let the oil run out and the drowned insect may come out.

A medical officer should be consulted when a foreign body cannot be removed from the ear.

CHAPTER 11

RESCUE AND TRANSPORTATION PROCEDURES

It is a basic principle of first aid that an injured person must be given essential treatment BEFORE being moved. However, it is obviously impossible to treat injuries while the casualty is in a position of immediate danger. If the victim is drowning, or if his life is endangered by fire, steam, electricity, poisonous gases, explosive vapors, or other hazards, he must be rescued before first aid treatment can be given.

The life of an injured person may well depend upon the manner in which he is transported to a medical officer. Rescue operations must be accomplished quickly, but unnecessary haste is both futile and dangerous. After rescue, and after essential first aid treatment has been given, further transportation must be accomplished in a manner that will not aggravate the injuries.

In this chapter, we will consider the use of common types of protective equipment, phases of rescue operations, ways of effecting rescue from dangerous situations, emergency methods of moving injured persons to safety, and procedures for transporting them after first aid care has been given.

PROTECTIVE EQUIPMENT

The use of appropriate items of protective equipment will increase your ability to rescue a person from life-threatening situations. Protective equipment that is generally available on naval vessels and at some shore activities includes oxygen breathing apparatus; air-line masks; survival support devices; protective (gas) masks; wire tending lines; and devices for detecting oxygen insufficiency, explosive vapors, and some poisonous gases.

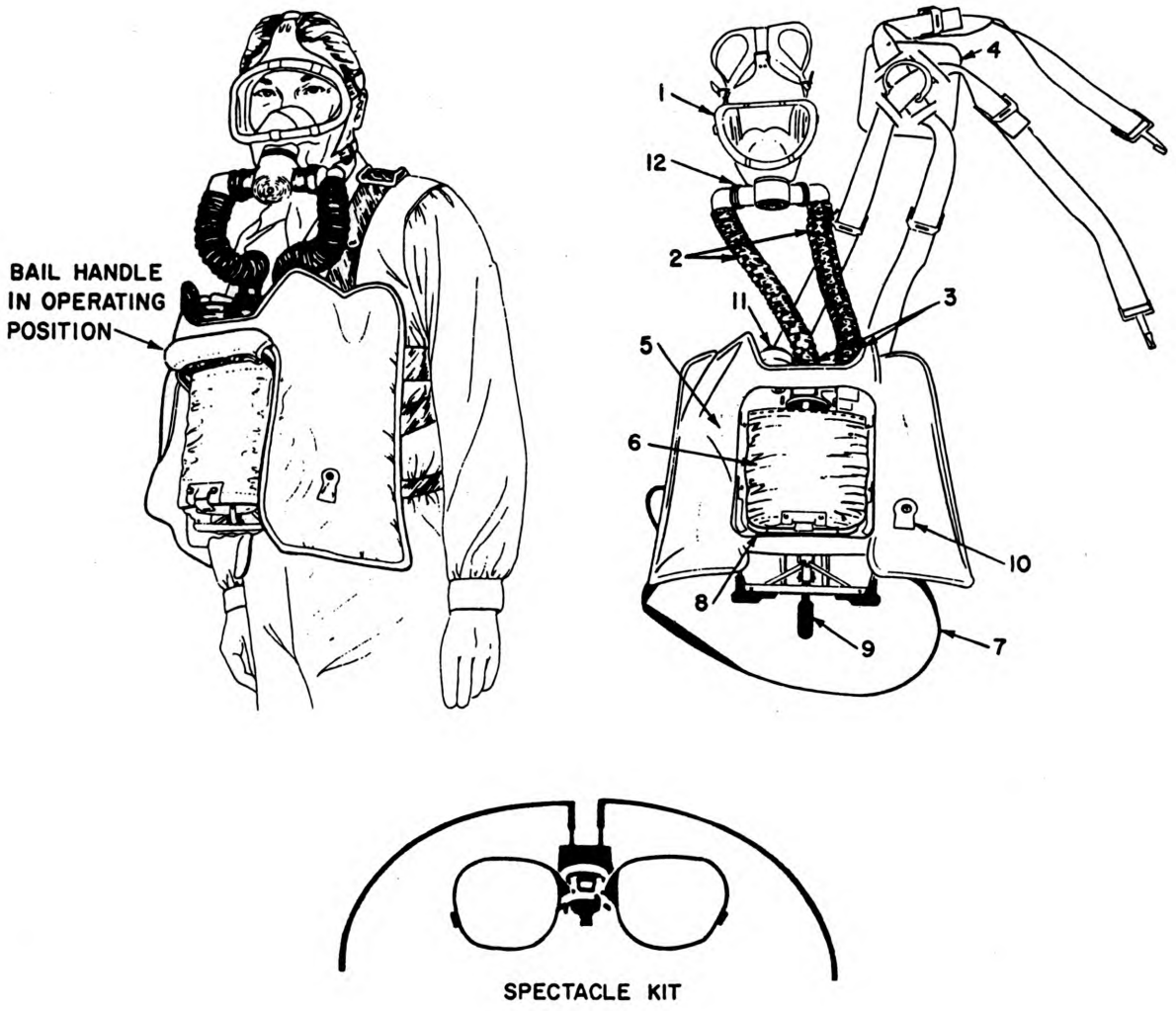
OXYGEN BREATHING APPARATUS

An Oxygen Breathing Apparatus (OBA) is provided for emergency use in compartments containing toxic gases and in which there is insufficient oxygen to support life. The air-line mask is preferred to the oxygen breathing apparatus if explosive vapors are present. There is no limitation as to the concentration of gas, smoke, dust, or deficiency of oxygen in which the apparatus will function effectively. The OBA is particularly valuable for rescue purposes because it is a self-contained unit. The wearer is not dependent upon outside air or upon any type of air line within the effective life of the canister.

The A-4 Oxygen Breathing Apparatus, which is illustrated in figure 11-1, is the newest self-contained breathing device in use aboard ship. Independence from the outside atmosphere is achieved by having air within the apparatus circulated through the canister. Within the canister, carbon dioxide and moisture from the inhaled air interact with potassium superoxide to generate oxygen. The effective life of the canister is approximately 60 minutes, depending on the amount of work being done. For safety purposes, the alarm is set for 30 minutes to ensure that the wearer does not deplete his oxygen source. The facepiece contains a speaking diaphragm. For personnel wearing eyeglasses, an optical kit is available which can be inserted into the facepiece of the A-4 OBA. This optical kit is obtained through the supply system, using the prescription of the individual's glasses. Once prescription lenses have been installed, the optical kit can only be used by that individual and will be retained as personal glasses.

If you are to enter an extremely hazardous area, you should also wear a tending line. Ideally, the tending line should be tended by two rescue personnel, one of whom is also wearing an OBA.

Never allow oil or grease to come in contact with any part of an oxygen breathing apparatus. Oxygen is violently reactive in the presence of grease or oil and an explosion may result. If any part of the apparatus becomes contaminated with oil or grease smudges, clean it before it is stowed. Care should be taken to prevent oil or oily water from entering the canister between the time it is



1. FACEPIECE
2. BREATHING TUBES
3. BREATHING TUBE COUPLINGS
4. BODY HARNESS AND PAD
5. BREATHING BAG
6. BREASTPLATE
7. WAIST STRAP
8. BAIL ASSEMBLY HANDLE (STANDBY POSITION)
9. CANISTER RELEASE STRAP
10. PRESSURE RELIEF VALVE AND PULL TAB
11. TIMER
12. VALVE HOUSING

Figure 11-1.—A-4 OBA.

opened and the time of disposal. Used canisters should be properly disposed of to ensure that they do not become mixed with unused canisters.

AIR-LINE MASKS

Air-line masks are part of the allowance of all ships having repair party lockers. They are smaller than the oxygen breathing apparatus and can therefore be used by persons who need to enter voids and other spaces that have very small access hatches. They are provided for use in atmospheres that contain toxic vapors, fumes, gases, dust, and during emergency conditions if the situation precludes testing for explosive gases. **THE AIR-LINE MASKS ARE NOT TO BE USED WHILE YOU ARE DOING HOT WORK.**

The air-line mask shown in figure 11-2 consists essentially of a demand air flow, a speaking diaphragm, a one-piece lens, an adjustable head

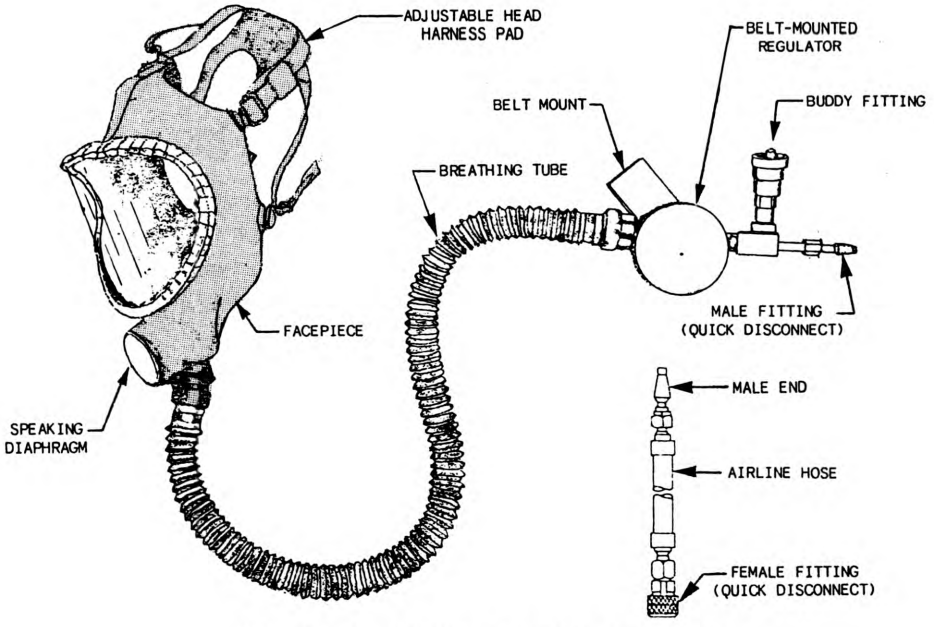


Figure 11-2.—Air-line hose mask components.

harness, a corrugated breathing tube, and a belt-mounted demand regulator. In addition, 25 feet of air line hose is provided. The air-line mask unit can use two sources of air: (1) a compressed air cylinder and (2) the ship's low pressure air line. A compressed air cylinder will supply air flow for about 8 hours. The ship's low pressure air line can use either a two-valve or a four-valve air manifold, making it possible to use up to four hose lines at one time. When low pressure air is used, an oil separator must be installed in the line to remove oil from the air.

CAUTION: THE AIR-LINE MASK USES AIR, NOT PURE OXYGEN. Never connect the air line to an oxygen bottle or other source of oxygen. Even a small amount of grease or oil in combination with oxygen could cause an explosion. The mask is not to be worn for fighting fires. The OBA is used for this purpose.

Safety belts are furnished with each air-line mask and **MUST BE WORN.** A tending line must be fastened to the safety belt, and the tending line should be loosely lashed to the air hose to reduce the possibility of fouling. The air hose and tending line must be tended at all times so that they will not become fouled or cut. Remember that if you are operating the tending line, you are responsible for the life at the other end. The personnel involved in the use and operation of the air-line mask unit with the tending line should maintain communication by means of the OATH code. The **OATH** code is as follows:

Code	Signal	Meaning
O	1 pull	OK
A	2 pulls	Advance
T	3 pulls	Take up
H	4 pulls	Help

EMERGENCY ESCAPE BREATHING DEVICES

The Emergency Escape Breathing Device (EEBD) is an emergency escape apparatus that supports life in a smoke-filled area for up to 15 minutes. An older unit, the Survival Support Device (SSD) is good for about 8 minutes and can be recharged for repeated use. The EEBD cannot be recharged. Emergency Escape Breathing Devices or Survival Support Devices are found in all engineering spaces and should be in all berthing spaces of a ship.

The Emergency Escape Breathing Device is composed of a plastic faceplate, a hood, an air module, coiled tube reservoir, and a carrying case. The unit is started by simply pulling a ring located at the bottom of the unit when it is out of the case. The clear plastic facepiece is slipped over the person's head and is held firm by an elastic neckpiece. The air enters the face mask at a temperature of approximately 40°F (4.4°C)

thereby preventing fogging and overheating of the face mask. The plastic hood will resist penetration from direct flame contact for about 3 to 6 seconds. The Emergency Escape Breathing Device can be immersed in water at any time, does not hinder your ability to swim, and assists in buoyancy by keeping your head above water.

When using an Emergency Escape Breathing Device or Survival Support Device on an injured or unconscious person, you MUST constantly monitor the device to ensure that the injured casualty does not suffocate. After the 15-minute period of air flow (8 minutes for the SSD), you must remove the hood. See figure 11-3. In addition, the Emergency Escape Breathing Device is not designed for firefighting.

PROTECTIVE (GAS) MASKS

Protective (gas) masks provide respiratory protection against most chemical, biological, and radiological warfare agents. They do not provide protection against the effects of carbon monoxide, carbon dioxide, and a number of industrial gases. Protection from these gases is discussed in the section on "Rescue From Unventilated Compartments." Also, these gas masks do not protect against oxygen deficiency.

The general operation of all gas masks is basically the same. As the wearer inhales, air is drawn through a filter system that traps solid or liquid particles, and also neutralizes toxic and irritant vapors. The most important thing to remember about protective (gas) masks is that they do not produce or supply oxygen; therefore, they should not be used in an atmosphere containing less than 16 percent oxygen or in air having a concentration of smoke from oil fires.

Finally, confusion and haste may result in someone using the wrong respirator mask for the job at hand. Responsible personnel must be familiar with the respirator types, selection, use, and maintenance procedures. One type of protective mask is the M-17, which is shown in figure 11-4. Surgical masks are still being used in the fleet for respiratory protection. These masks provide ZERO filtering capability against respirable-sized particles and provide a false sense of security.

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Figure 11-4.—M-17 protective mask.

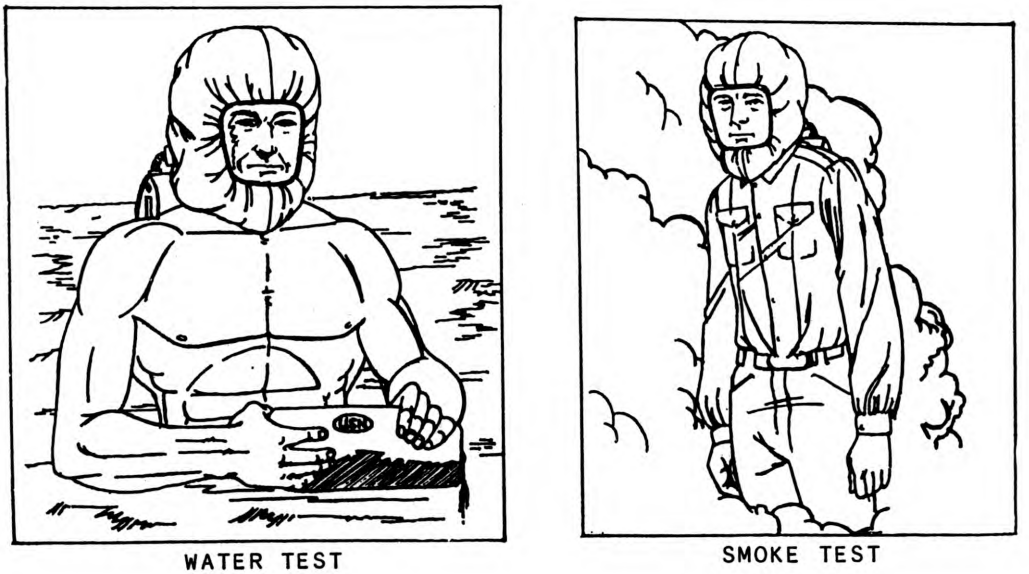

Figure 11-3.—EEBD in tests.

PROXIMITY SUIT

The proximity suit is a two-piece fire-resistant rescue suit. The advantage that this suit has over the basic fire fighting suit is that it can withstand higher temperatures. The proximity suit is **NOT TO BE USED FOR ACTUAL FIRE FIGHTING.** It is to be used for emergency rescue, but not for any extended time. Usually you will find these suits in areas where the incidence of aircraft crashes could be high.

The proximity suit should not be worn to enter an area of flame, but should be used when a path free of flame has been established by a fire party. The person wearing the proximity suit should return to the safety zone immediately if he experiences severe discomfort, such as difficulty in breathing or extreme heat. Heavy clothing should be worn under the suit to give additional protection from the heat. When you finish using the suit, ensure that the suit is cleaned, dried, and inspected for damage prior to stowing.

TENDING LINE

The tending line is a plastic covered steel-wire cable which is 50 feet ling. Each end is equipped with a strong hook that closes with a snap catch. The line is very pliable and will slide freely around obstructions. The tending line is also known as a lifeline. Figure 11-5 illustrates a tending line. Tending lines are used as a precautionary measure to aid in the rescue of persons wearing rescue breathing apparatus, hose masks, or similar equipment.

Rescue should be accomplished by having another person equipped with a breathing apparatus follow the tending line rather than attempting to drag a person out. Attempts to drag a person from a space may very well result in fouling or in parting the harness, in which case it would still be necessary to send a rescuer into the space.

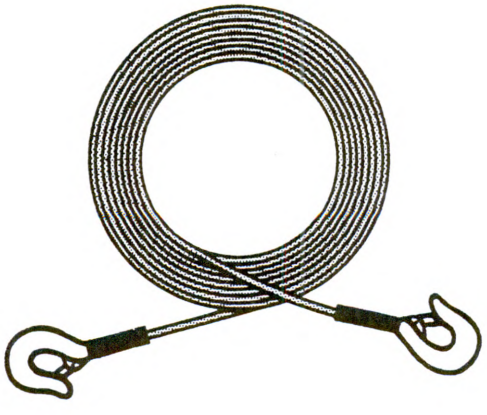

Figure 11-5.—Tending line.

An important precaution in the use of tending lines should be obvious, but it is stated here because in the excitement of fire or other emergencies it may be forgotten. The tending line may be followed by a rescuer to find an injured firefighter. A stricken person must never be hauled up by a tending line attached to the waist. In haste the rescuer could lose his grip and cause severe falling injuries to the victim.

When operating a tending line, rubber gloves must be worn for (1) proper line handling and (2) protection from electrical hazards. Play out the line carefully so that it will not foul. Even though the tending line is plastic coated, it is advisable to keep the tending line in contact with grounded metal, and never allow it to come in contact with energized electrical equipment.

DETECTION DEVICES

The detection devices used to test the atmosphere in closed or poorly ventilated spaces include the Oxygen Indicator for detecting oxygen deficiency, the Combustible Gas Indicator for determining the concentration of explosive vapors, and toxic gas indicators such as the "Drager" multi-gas detector, to detect the presence of toxic gases. These devices are extremely valuable and should be used whenever necessary; however, they must be used only as directed. Improper operation of these devices may lead to false assurances of safety, or worse yet, to an increase in the actual danger of the situation.

RESCUE PROCEDURES

If you are faced with the problem of rescuing a person threatened by fire, explosive vapors, poisonous gases, or any other emergency, do not take any action until you have had time to determine the extent of the danger and your ability to cope with it. In a large number of cases, the rescuer rushes in and becomes the second victim. Two dangerous examples would be climbing into a void or space with poisonous gases, or rushing in to help your buddy lying on the ground when he is still in contact with an electrical current. Do not take any unnecessary chances by attempting

any rescue that heedlessly endangers your own life. Your main objective as a rescuer is to help someone in need; do not fail him by becoming a victim, too.

PHASES OF RESCUE OPERATIONS

In disasters where there are multiple victims (as in explosions or ship collisions), rescue operations should be performed in phases. These rescue phases are distinct and different from emergency care priorities (triage). Since we are talking about rescue operations, the focus will be on extrication procedures.

The first phase is to remove the lightly pinned casualties, such as those who can be freed by lifting a beam or removing a small amount of debris. In the second phase, remove those casualties who are trapped in more difficult circumstances but who can be rescued by the use of the equipment at hand and in a minimum amount of time. In the third phase, remove those casualties where extrication is extremely difficult and where much time can be taken to effect the rescue. This type may possibly involve cutting through decks or an expanse of metal, breaching walls, or removing large amounts of debris. An example would be rescuing a worker from beneath a large, heavy piece of machinery. The last phase is the removal (extrication) of dead bodies.

RESCUE FROM FIRE

If you must go to the aid of a person whose clothing is on fire, try to smother the flames by wrapping the person in a coat, blanket, or rug. Leave his head uncovered. First beat out the flames around his head and shoulders, then work downward toward his feet. If you have no material with which to smother the fire, roll the victim over slowly and beat out the flames with your hands. If the victim tries to run, catch him and keep him down. Remember that he MUST lie down while you are trying to extinguish the fire. If the victim sits or stands, he may be killed instantly by inhaling flames or hot air.

CAUTION: Inhaling flames or hot air can kill YOU, too. Do not place your face directly over the flames. Turn your face away from the flames when you inhale.

If your own clothing catches fire, roll yourself up in a blanket, coat or rug. **KEEP YOUR HEAD UNCOVERED.** If material to smother the fire is not available, lie down, roll over slowly, and beat the flames with your hands.

If you are trying to escape from an upper floor of a burning building, be very cautious about opening doors into hallways or stairways. When a building is on fire, hot air often collects in halls and stairwells. Always feel a door before you open it; if it feels hot, do not open it.

If you are faced with the problem of removing an injured person from an upper floor of a burning building, you may be able to improvise a lifeline by tying sheets, blankets, curtains, or other materials together using square knots. Secure one end around some heavy object inside the building, and fasten the other end around the casualty under his arms. You can lower the victim to safety, and then let yourself down the line. Do not jump from an upper floor of a burning building except as a last resort.

It is often said that the best air in a burning room or compartment is near the floor, but this is true only to a limited extent. There is less smoke and flame down low, near the floor, and the air may be cooler; however, carbon monoxide and other deadly gases are just as likely to be present near the floor as they are near the ceiling. If possible, use an oxygen breathing apparatus or other protective breathing equipment when you go into a burning compartment. If protective equipment is not available, cover your mouth and nose with a wet cloth to reduce the danger of inhaling smoke, flame, or hot air. Remember, however, that a wet cloth gives you no protection against poisonous gases or lack of oxygen. Also, do not use elevators during a fire.

RESCUE FROM STEAM-FILLED SPACES

It is sometimes necessary to rescue a person from a space in which there is a steam leak. Since steam rises, escape upward may not be possible. If the normal exit is blocked by escaping steam, move the casualty to the escape trunk or, if there is none, to the lowest level in the compartment. While in a steam-filled space, be careful not to inhale any steam, since there is a great danger of respiratory difficulty due to the hot steam, causing tissues in the throat, nose, and lungs to swell and block the airway.

RESCUE FROM ELECTRICAL CONTACT

Rescuing a person who has received an electrical shock is likely to be difficult and

dangerous. You must not touch the casualty's body, the wire, or any other object that may be conducting electricity. Look for the switch and turn off the power immediately, but do not waste time hunting for the switch, as every second is important. If you cannot find the switch, you should try to remove the wire from the casualty or the casualty from the wire. You can use items like a dry rope, dry clothing, a dry broom, wooden oar, board, or similar nonconducting object. See figure 11-6. You can also break the contact by cutting the wire with a wooden handled ax, but this is extremely dangerous because the cut ends of the wire are likely to curl and lash back at you before you have time to move out of the way.

One of the old favorite utensils used to remove someone from an electrical contact is the uniform belt. But be careful since belts were made of cotton which was good to use, but are now made of nylon and other conductive materials. When you are trying to break an electrical contact, always stand on some nonconducting material. The old drop kick routine can be extremely dangerous when you are dealing with electricity; therefore, stick with a nonconducting object, and do not put your life on the line needlessly.

RESCUE FROM UNVENTILATED COMPARTMENTS

Rescuing a person from a void, double bottom, gasoline or oil tank, or any closed compartment or unventilated space is generally a very hazardous operation. Aboard naval vessels and at naval shore activities, no person is permitted to enter any such space or compartment until a gas free engineer or damage control officer has indicated that the likelihood of suffocation, poisoning, fire, or explosion has been eliminated as much as possible. The rescue of a person from any closed space would, therefore, be performed under the supervision of a damage control officer or in accordance with the officer's instruction. In general, it is necessary to observe the following precautions when you are attempting to rescue a person from any closed or poorly ventilated space:

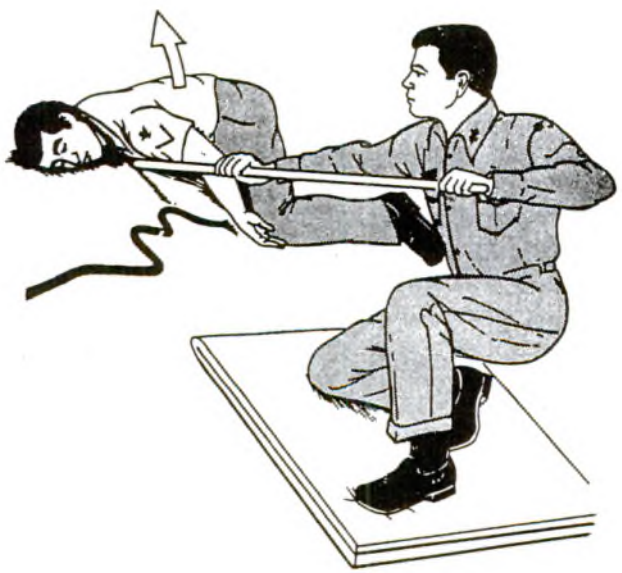

Figure 11-6.—Pushing a victim away from a power line utilizing a nonconductor.

1. If possible, test the air for explosive vapors, poisonous gases, and oxygen deficiency, as mentioned in the section on "Detection Devices."
2. Wear an air-line mask or oxygen breathing apparatus. The air-line mask is preferred for use in spaces that may contain high concentrations of oil or gasoline vapors. Do not use a protective (gas) mask or a wet cloth held over your face to protect you from oxygen deficiency or poison gases.
3. Before going into a compartment that may contain explosive vapors, be sure that backup personnel are stationed nearby with fire extinguishing equipment.
4. When going into any space that may be deficient in oxygen or that may contain poisonous gases or explosive vapors, be sure to maintain communication with someone outside. Wear a tending line and be sure that it is tended by two people, one of whom is also wearing an air-line mask or some other type of protective device.
5. Do not use, wear, or carry any object or material that might cause a spark. Matches, cigarette lighters, flashlights, candles, or other open flame, and ordinary electric lights must never be taken into any compartment that may contain explosive or flammable vapors. The portable light used by cleaning parties in boilers, fuel tanks, and similar places may be taken into a suspect compartment. This is a steamtight glove-type light in which all the exposed metal parts are either made of a nonsparking alloy or are protected in some way so that they will not strike a spark.

Particular caution must be taken when using the steel-wire tending line in compartments that may contain explosive vapors. Be certain that it is carefully tended and properly grounded at all times. When other considerations permit, you should use a rope instead of a steel-wire tending line when entering compartments that may contain explosives.

RESCUE FROM WATER

You should never attempt to swim to the rescue of a drowning person unless you have been trained in lifesaving methods—and then, only if there is no better way of reaching the victim. If you do not have the skills, or if the conditions do not warrant rescue by swimming, you should note the exact location of the victim (time and any landmarks), and seek help immediately. Many double drownings occur when untrained people attempt swimming rescues.

A drowning person may panic and fight you so violently that you may be unable to either rescue the victim or save yourself. Even if you are not a trained lifesaver, you can help a drowning victim by holding out a pole, oar, branch, or stick for the person to grab, throwing a lifeline, or throwing a buoyant object such as a life preserver, jug, thermos, or wood—which will support the victim.

Various methods are used aboard ship to pick up survivors in the water. The method used in any particular instance will depend upon weather conditions, the type of equipment available aboard the rescue vessel, the number of personnel available for rescue operations, the physical condition of the people requiring rescue, as well as other factors.

In the past, cargo nets have been used to allow survivors to climb up the side of rescuing ships, but many were unable to climb them without assistance. Personnel equipped with lifelines (and antiexposure suits, if necessary) were sent over the side to help survivors up the nets. If survivors are covered with oil, it could take the combined efforts of four or five people to get one survivor up the net. More recently, rescue operations include the use of motor whaleboats (life boats) or helicopters.

A seriously injured person should never, except in an extreme emergency, be pulled from the water by means of a rope or tending line. Special methods must be devised to provide proper support for the victim, to keep him in a horizontal position, and to protect the person from any kind of jerking, bending, or twisting motion. The Stokes stretcher (described later in this chapter) can often be used to rescue an injured survivor. The stretcher is lowered into the water and the survivor is floated into position over it. Personnel on the deck of the ship can then bring the stretcher up by means of handlines. Life preservers, balsa wood, unicellular material, or other flotation gear can be used if it is necessary to keep the stretcher afloat.

MOVING THE CASUALTY TO SAFETY

In an emergency, you may have to hoist, carry, or drag an injured person away from a position of danger. In some instances, you will have to move the casualty by using the fireman's carry, the tied-hands crawl, the blanket drag, the pack-strap carry, the chair carry, or some type of arm carry. Occasionally, it is necessary to move the victim with all possible speed, without regard to the severity of the injuries. Remember, however, that when you move an injured person, you are taking a calculated risk: **YOU MAY KILL THE VICTIM BY MOVING HIM.** You are justified in taking such a risk only when it is evident that the victim will die if he is not moved.

Neil-Robertson Stretcher

The Neil-Robertson stretcher (figure 11-7) is specially designed for removing an injured person from engineroom spaces, holds, vertical trunks, and other compartments where access hatches

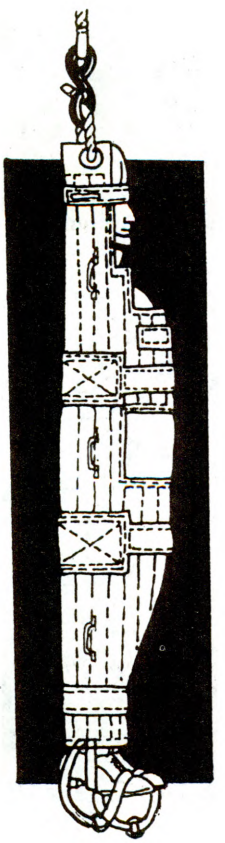

Figure 11-7.—Neil Robertson stretcher.

or ladders are too small to permit the use of regular stretchers. This stretcher is extremely valuable aboard ship. It is made of semi-rigid canvas that has wooden slats sewn inside the canvas and canvas straps to secure the victim in the stretcher. Some of the straps use the safety belt concept. When firmly wrapped around the casualty in mummy fashion, this stretcher gives sufficient support so the casualty may be lifted vertically. The stretcher has a strap at each end with a metal ring, in which handling lines are tied. These handling lines are used for safety purposes, to make sure that the casualty does not fall if someone lets go of the stretcher. The stretcher should always be carried by the handles.

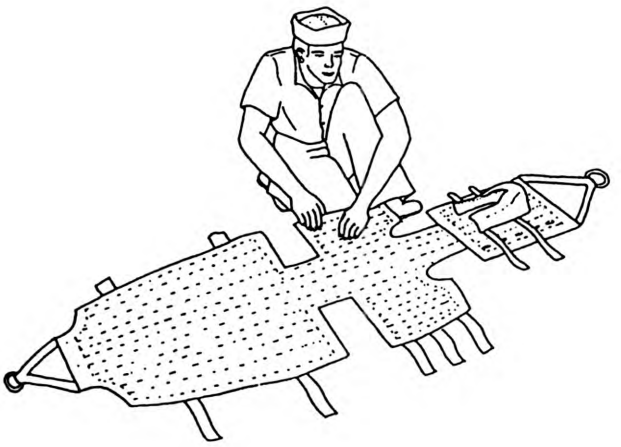

Figure 11-8.—Neil-Robertson Stretcher. Arrange the stretcher as depicted.

Figure 11-9.—Neil-Robertson Stretcher. Remove the hood.

Figures 11-8 through 11-13 give step-by-step instructions on the use of the Neil-Robertson stretcher.

The Stokes stretcher is a commonly used litter for transporting a person, as illustrated in

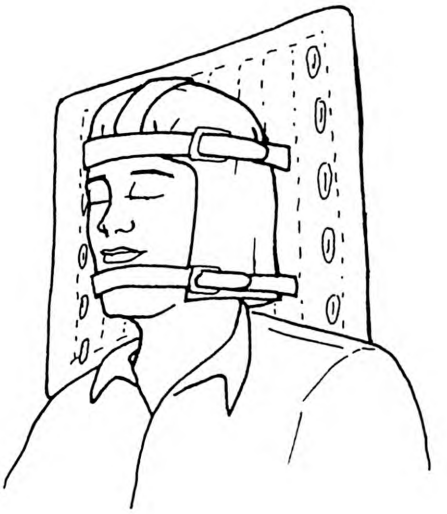

Figure 11-10.—Neil-Robertson Stretcher. Place the hood on the victim. This is easier than trying to place the victim in the hood while it is still attached to the stretcher.

Secure the upper strap across the forehead of the victim and the lower strap across the chin.

CAUTION: Be sure that the lower strap does not slip as it could choke the victim.

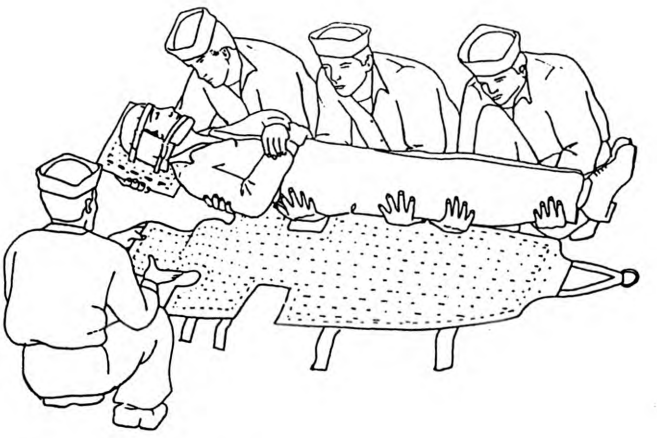

Figure 11-11.—Neil-Robertson Stretcher. Three persons should pick up the victim as depicted. A fourth person should be available to slide the stretcher under the victim. In placing the victim in the stretcher, ensure that the shoulders line up with the arm holes and chest flaps.

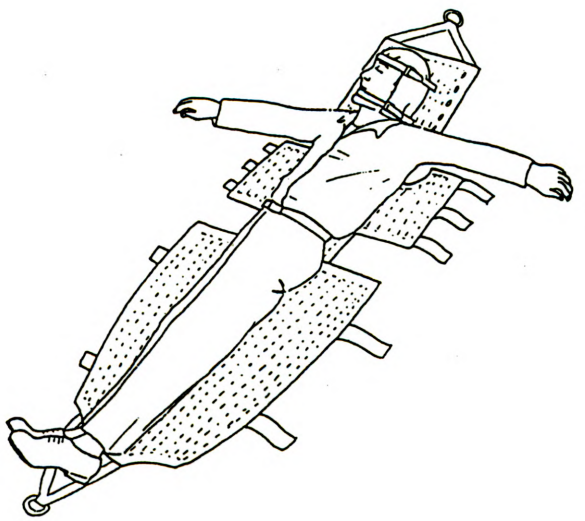

Figure 11-12.—Neil-Robertson Stretcher. Place the victim on the stretcher. If the victim is a short person, make sure that his or her armpits are even with the cut out section of the flap. This will place the casualty in the correct position in the stretcher and prevent him from slipping out. Secure the hood to the stretcher. Place the chest flaps over the patient's chest and under his arms.

Secure the outer chest straps over the victim's chest and under his arms. Secure the arms to his side by placing the middle chest strap over the upper arms and chest.

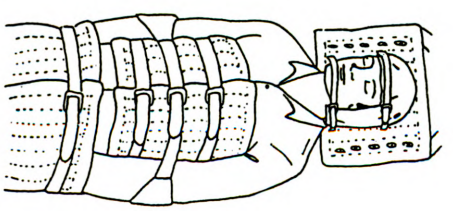

Figure 11-13.—Neil-Robertson Stretcher. Fold the leg flaps in place over the victim's legs. If the victim is positioned correctly his hands will be under the leg flap and against his thigh. Secure the leg straps.

figure 11-14. The Stokes stretcher is essentially a wire basket supported by steel rods, some with a plastic coating to resist rust. It is adaptable to a variety of uses. The casualty can be held securely in place, even if the stretcher is tipped or turned. The Stokes stretcher is particularly valuable for transporting injured persons to and from ships. As mentioned earlier, it can often be used to rescue injured survivors from the water. It is also used for direct ship-to-ship transfer of injured persons. When used over or near the water's edge, flotation devices should be attached to the stretcher.

This stretcher should be padded with at least one blanket to line the inside of the stretcher, to add comfort, and to protect the victim against sharp edges on the basket. Another blanket should be used to cover the victim for warmth, leaving his arms exposed to alleviate the fear of being constrained.

If the person is to be placed in a shock position, two blankets can be rolled up so that one blanket can be placed under each leg. The casualty should be lowered gently into the stretcher and made as comfortable as possible. The casualty should be strapped into the stretcher with straps over the chest and arms, hips, and knees. Note that the straps go over the blanket or outer covering to keep it in place.

The Stokes stretcher is best used when travel is by elevator or along the same deck. When extensive travel throughout the ship is expected, the Neil-Robertson stretcher should be used. It is very difficult to maneuver the Stokes stretcher through hatches, up small ladders, and around tight corners.

Army Litter

The Army litter, shown in figure 11-15, is a collapsible stretcher made of canvas and supported

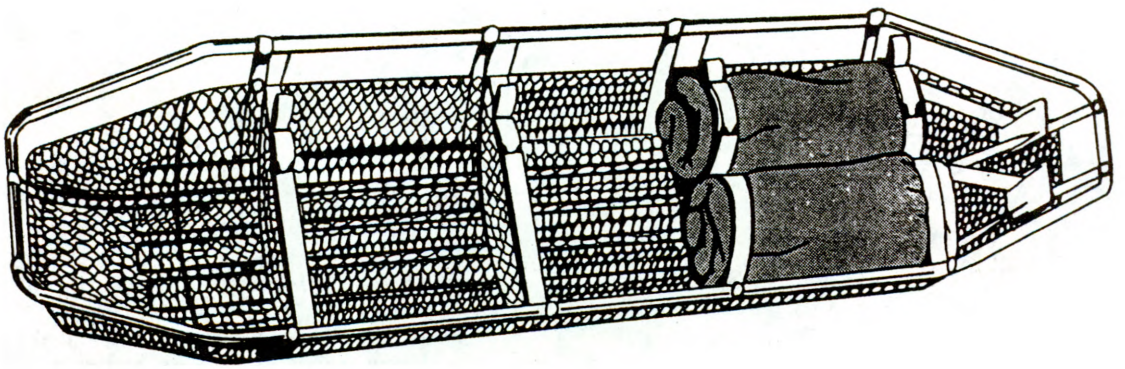

Figure 11-14.—Stokes stretcher.

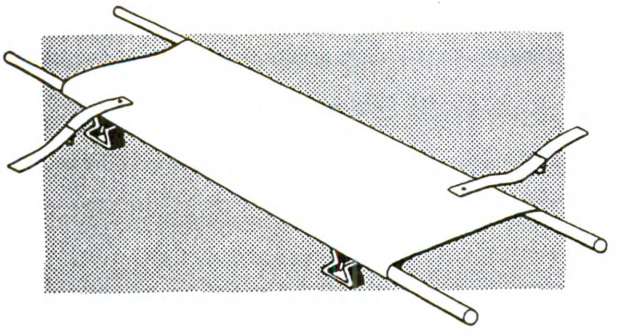

Figure 11-15.—Army litter.

by wooden or aluminum poles. It is very useful for transporting battle casualties in the field. However, it is sometimes difficult to fasten the casualty onto the Army litter. For this reason, its use is limited aboard ship. It is most useful aboard ship in mass casualty situations to hold casualties in one stationary area.

Improvised Stretchers

The Stokes stretcher, Neil-Robertson stretcher, or Army litter should be used whenever possible to transport injured personnel. If these stretchers are not available and the situation warrants immediate transportation of a casualty, it may be necessary to improvise with some other means of transport.

Shutters, doors, boards, and even ladders may be used as stretchers. All stretchers of this kind must be well-padded, and great care must be taken to ensure that the casualty is fastened securely in place.

Sometimes a blanket may be used as a stretcher, as depicted in figure 11-16. The casualty is placed in the middle of the blanket on his back. Three or four people kneel on each side and roll the edges of the blanket toward the casualty as shown in figure 11-16A. When the rolled edges are tight and large enough to grasp securely, the casualty should be lifted and carried as shown in figure 11-16B.

Stretchers may also be improvised by using two long poles (about 7 feet long) and any strong cloth, such as a rug, a blanket, a sheet, a mattress cover, two or three gunny sacks, or two coats. Figure 11-17 shows an improvised stretcher made from two poles and a blanket.

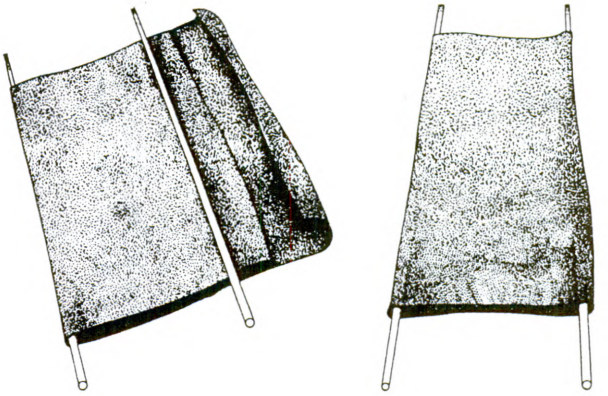

Figure 11-17.—Stretcher made from poles and a blanket.

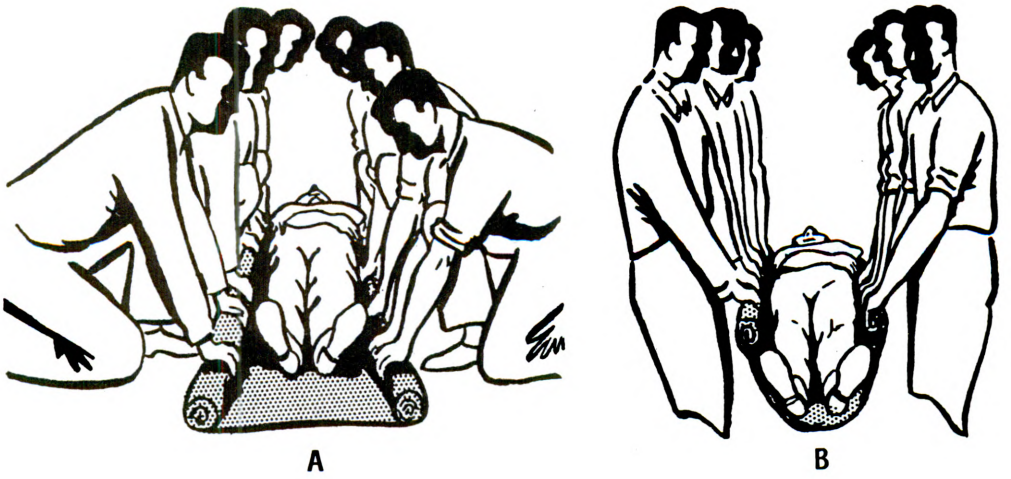

Figure 11-16.—Blanket used as improvised stretcher.

CAUTION: Many improvised stretchers do not give sufficient support to be used in cases where there are fractures or extensive wounds. They should be used only when the casualty is able to stand some sagging, bending, or twisting without serious consequences. In addition, you must determine if the casualty needs to be moved before an adequate stretcher is available. **NOTE:** Usually, while you are administering first aid to a casualty, someone else could go for a stretcher to save time. If a stretcher is put off to the side on a weather deck for any reason and for any period of time, it would be wise to ensure that the victim is not strapped in. The reason for this is to enable the victim to swim in case the stretcher is bumped or blown off into the water. If the victim is strapped into the stretcher (without a flotation rig), he may drown if the stretcher goes under water.

Emergency Rescue Lines

As previously mentioned, the steel-wire tending line can often be used to pull a person to safety. An emergency rescue line can also be made from any strong fiber line. Both should be used only in extreme emergencies, when an injured person must be moved and no other means is available.

Figure 11-18 illustrates an emergency rescue line that could be used to hoist a person from a void or small compartment. Notice that a running bowline is passed around the body, just below the hips, and a half hitch is placed just under the arms. Notice also that a guideline is tied to the casualty's ankles to keep him from banging against bulkheads and hatchways.

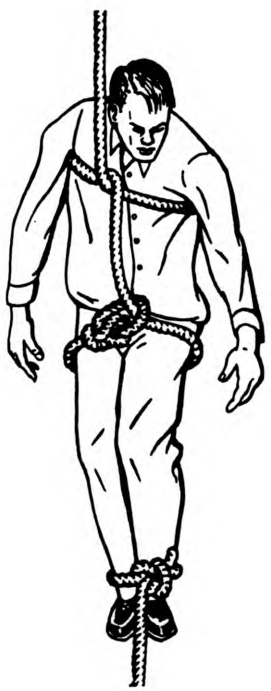

Figure 11-18.—Emergency rescue line.

Fireman's Carry

One of the easiest ways to carry an unconscious person is by means of the fireman's carry. The fireman's carry, which is illustrated in figure 11-19, is performed by the following steps:

1. Turn the casualty so that he is lying flat, with his face down. Kneel on one knee at the victim's head, facing him. Pass your hands under his armpits; then slide your hands down his sides and clasp them across his back.
2. Raise the casualty to his knees. Take a better hold across the casualty's back.
3. Raise the casualty to a standing position, and stick your right leg between the casualty's legs. Grasp his right wrist in your left hand and swing his arm around the back of your neck and down your left shoulder.
4. Stoop quickly and pull the casualty across your shoulders and simultaneously put your right arm between his legs.
5. Grasp his right wrist with your right hand and straighten up. The procedure for lowering the casualty to the deck is also shown in figure 11-19.

Tied-Hands Crawl

The tied-hands crawl, depicted in figure 11-20, may be used to drag an unconscious person for a short distance. It is particularly useful when you must crawl underneath a low structure.

To carry a person by this method, turn him so that he is lying flat on his back. Cross his wrists and tie them together. Kneel astride the casualty and lift his arms over your head so that his wrists are at the back of your neck. When you crawl forward, raise your shoulders high enough so that the casualty's head will not bump against the deck.

Blanket Drag

The blanket drag, shown in figure 11-21, can be used to move a person who is so seriously injured that he should not be lifted or carried by one person alone. Place the casualty on his back on a blanket, and pull the blanket along the floor

Figure 11-19.—Fireman's carry.

Figure 11-20.—Tied-hands crawl.

or deck. Always pull the casualty head first, with his head and shoulders slightly raised, so that his head will not bump against the deck.

Pack-Strap Carry

With the pack-strap carry, illustrated in figure 11-22, it is possible to carry a heavy person for some distance. Use the following procedure:

1. Place the casualty lying down, with his face up.
2. Lie down on your left side along the casualty's uninjured or less injured side. Your shoulder should be next to his armpit.
3. Pull the casualty's far leg over your own, holding it there if necessary.

Figure 11-22.—Pack-strap carry.

4. Grasp the casualty's far arm at the wrist, and bring it over your upper shoulder as you roll and pull him onto your back.
5. Rise to your knees, using your free arm for balance and support. Hold both of the casualty's wrists close against your chest with your other hand.
6. Lean forward as you rise to your feet, and keep both of your shoulders under the casualty's armpits.

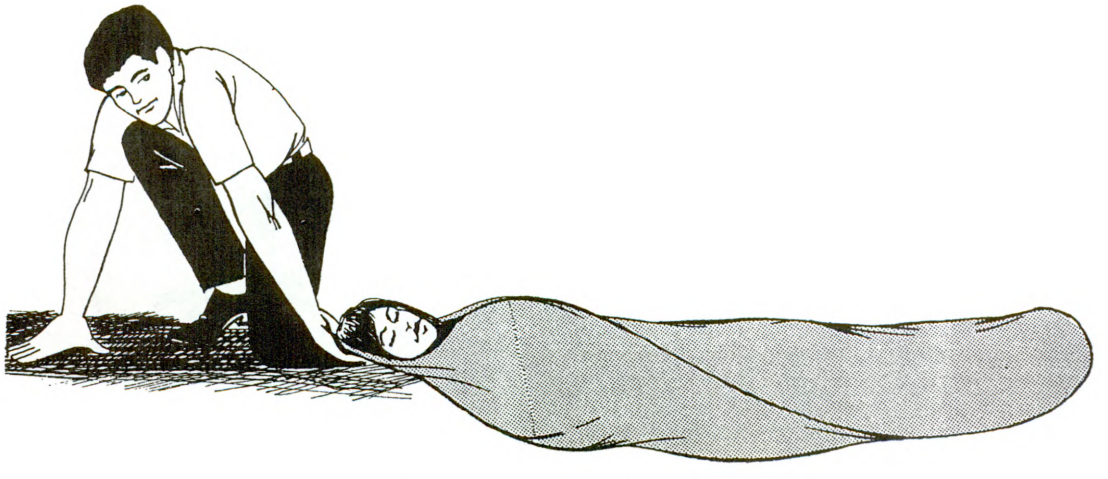

Figure 11-21.—Blanket drag.

Do not attempt to carry a seriously injured person by means of the pack-strap carry, especially if his arms, spine, neck, or ribs are fractured.

Chair Carry

The chair carry can often be used to move a sick or injured person away from a position of danger. The casualty is seated on a chair as shown in figure 11-23, and the chair is carried by two people. This is a particularly good method to use when you must carry a person up or down stairs or through narrow winding passageways. It is also advisable to tie a sheet or cloth around the person's waist and chair so the person will not slide while you are carrying him. It must never be used to move a person who has an injured neck, back, or pelvis.

Arm Carries

There are several kinds or arm carries that can be used in emergency situations to move an injured person to safety. Figure 11-24 shows how one person can carry the casualty alone. However, you should never try to carry a person in this manner if he is seriously wounded. Unless the person is considerably smaller than you are, you will not be able to carry the casualty very far by this method.

The two-man carry, illustrated in figure 11-25, can sometimes be used to move an injured person. However, it should not be used to carry a person who has serious wounds or broken bones.

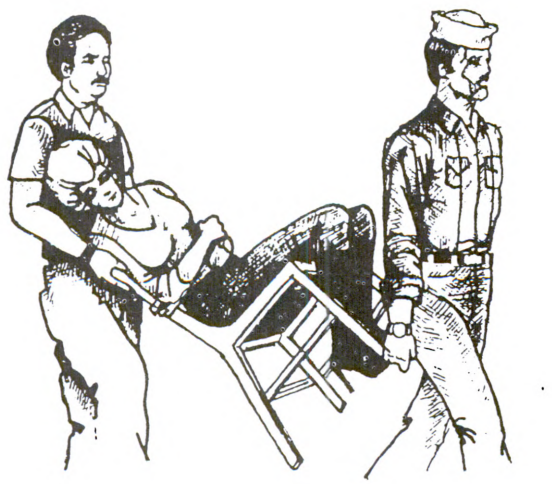

Figure 11-23.—Chair carry.

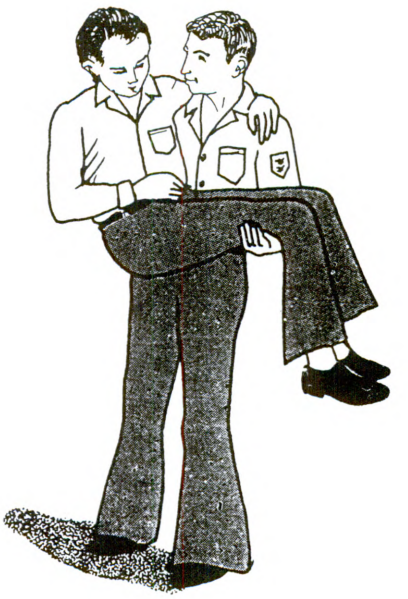

Figure 11-24.—One-man arm carry.

Figure 11-25.—Two-man carry by arms and legs.

Another two-man carry that can be used in emergencies is shown in figure 11-26. Two people kneel beside the casualty at the level of his hips, and carefully raise him to a sitting position. Each person puts one arm under the casualty's thighs; hands are clasped and arms are braced, as shown in figure 11-26A. Both people then rise slowly and steadily to a standing position, holding the casualty, as shown in figure 11-26B. This carry must not be used to move seriously injured persons.

TRANSPORTATION OF THE INJURED

Thus far in this chapter, we have dealt with EMERGENCY methods used to get an injured

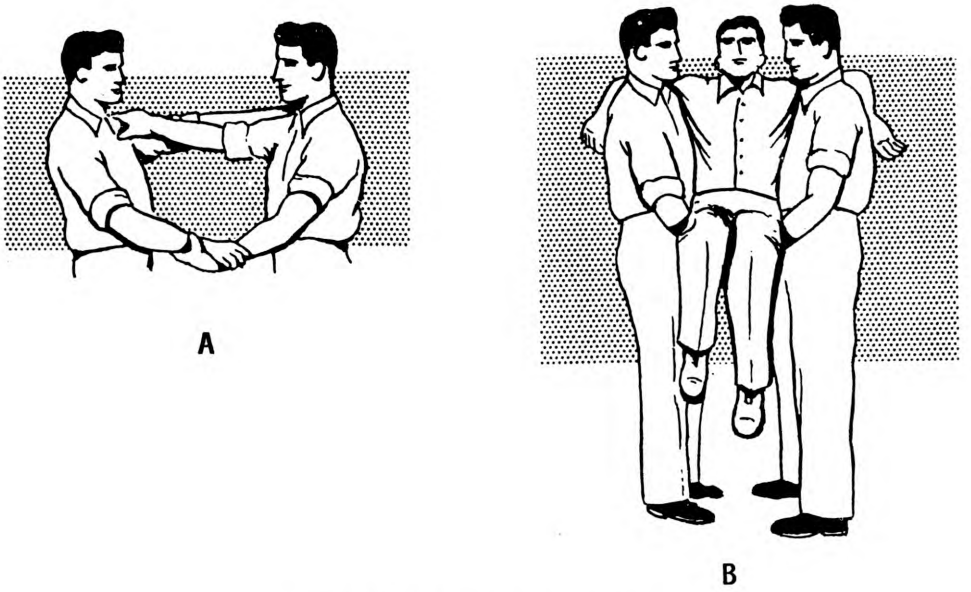

Figure 11-26.—Two-man arm carry.

person out of danger and into a position where he can receive first aid. As we have seen, these emergency rescue procedures often involve substantial risk to the casualty and should be used ONLY when clearly necessary.

Once you have rescued the casualty from the immediate danger that threatened him, SLOW DOWN. From this point on, handle and transport the casualty with every regard for the injuries that he sustained. In the excitement and confusion that almost always accompany an accident, you are likely to feel rushed, as though you must do everything rapidly. To a certain extent, this is a reasonable feeling. Speed is essential in treating many injuries and in getting the casualty to a medical officer or medical treatment facility. However, it is NOT reasonable to let yourself feel so hurried that you become careless and transport the casualty in a manner that will aggravate his injuries.

GENERAL PRECAUTIONS

The basic precautions that must be observed in transporting an injured person can be summarized as follows:

1. Whenever possible, give necessary first aid BEFORE attempting to transport the casualty. Be sure that all injuries have been located. Treat serious breathing problems, bleeding, and shock. Immobilize all fractures, sprains, and dislocations. Do whatever you can to reduce the casualty's pain and to make him as comfortable as possible under the circumstances.

2. Use a regular stretcher, if one is available; if you must use an improvised stretcher, be sure that it is strong enough. Also be sure that you have enough people to carry the stretcher, so that you will not run any risk of dropping the casualty.

3. Whenever possible, bring the stretcher to the casualty instead of carrying the casualty to the stretcher.

4. Fasten the casualty to the stretcher so that he cannot slip, slide, or fall off.

5. Use blankets, garments, or other material to pad the stretcher and to protect the casualty from exposure.

6. As a general rule, an injured person should be lying on his back while being moved. However, in some instances, the type or location of the injury will necessitate the use of another position. A person who is having difficulty in breathing because of a chest wound may be more comfortable if his head and shoulders are slightly raised. A person who has a broken bone should be moved very carefully so that the injury will not be made worse. If the casualty has received a severe injury to the head, he should be kept lying on his side or on his back, with his head turned to one side to prevent him from choking on saliva, blood, or vomitus while being transported. In all cases, it

is important to place the casualty in the position that will best protect him from further injury.

7. The stretcher should be carried in such a way that the casualty will be moved FEET FIRST, so that the rear stretcher bearer can continually watch the victim for signs of breathing difficulty. Also, the person will feel more relaxed if he is able to see where he is going.

8. If you must use a motor vehicle to transport a seriously injured person, the best means is an ambulance. If no ambulance is available, a truck or station wagon makes a fairly good substitute. If it is necessary to use a passenger car to transport a seriously injured person, do not attempt to put the casualty into the car until you have figured out the best place for him to be without undue bending, twisting, or turning.

9. Do not turn the casualty over to anyone without giving a complete account of the situation. Be sure that the person taking over knows what caused the injury and what first aid treatment has been given. If a tourniquet has been applied, make sure this is known by the person taking charge of the casualty. Also, prior to turning the casualty over to someone, make sure that you have information such as who the victim is and who you are turning him over to. This is one way of protecting yourself and at the same time ensuring that the patient will be in good hands.

CHAPTER 12

HEALTH MAINTENANCE

Your health is largely your responsibility. Through good habits of cleanliness, regular exercise, and good nutrition you have much control over your well-being. Good health is not an accident. It comes with conscious effort and good health habits. This chapter examines some basic principles with which you will want to familiarize yourself. Much of the following is common sense and may already be familiar to you. Even if familiar, the information is worth your time and review.

PERSONAL HYGIENE

Because of the close living quarters in the Navy, particularly aboard ship, personal hygiene is of utmost importance. Disease or ill health can spread and rapidly affect an entire compartment or division in a short period.

Uncleanliness or disagreeable odor will surely affect the morale of your shipmates. A daily bath or shower will assist in the prevention of body odor and is absolutely necessary to maintain cleanliness. The daily shower also aids in the prevention of common skin diseases. The use of medicated powders and deodorants will help keep the skin dry. Special mention of the feet seems appropriate at this point. That is, you should wash your feet daily, use powder to help keep them dry, and keep the toe nails trim. Shoes and socks should fit properly. Also, make sure you change your underwear and socks daily.

Hair should be shampooed at least once weekly, using a commercial shampoo of your choice. Military regulations aside, hair that is cut regularly and kept short is easier to maintain. Vigorous brushing for at least 1 minute daily, combined with the weekly shampoo, should adequately control dandruff and give you a neat well-groomed appearance.

The importance of washing your hands at appropriate times cannot be over emphasized. Hands should always be washed with soap and water following elimination and before meals.

Make sure you always use your own towels. Sharing towels with others is a good way to spread colds and infections. In addition, do not store wet towels in lockers or allow dirty towels to accumulate anywhere.

DENTAL HYGIENE

Care of the mouth and teeth by regular use of a toothbrush after meals and daily use of dental floss are essential to aid in the prevention of gum disease, infection, and tooth decay.

One of the major causes of tooth decay and gum disease is plaque. Plaque is an almost invisible film of decomposed food particles and millions of living bacteria. To prevent dental diseases, you must effectively remove this destructive film.

The toothbrush most often recommended by dentists has soft rounded bristles and a long straight handle. The soft bristles will not damage the outer covering of the teeth, the enamel, and will be effective if used in conjunction with dental floss. Unwaxed dental floss is generally more effective for cleaning between the teeth than the waxed product. The toothpaste used in brushing may be any one of the popular varieties containing fluoride. You should avoid using highly abrasive toothpastes, which often promise whiter teeth or claim to be natural, as they may destroy the tooth enamel.

The best toothbrushing technique should be done with firm, gentle pressure, using a back-and-forth movement. For most people dental decay and gum disease occur primarily between the teeth. Toothbrushing alone cannot effectively clean these areas. That is why flossing should be a part of your dental hygiene program. Remember to always floss before brushing.

Although brushing and flossing are important, your diet is of equal importance in the prevention of tooth decay. Avoidance of sweet drinks, candies, and other sugary foods is the single most

important thing you can do for your dental health.

The use of mouthwashes may take bad dragon breath away, but mouthwashes have little value in the prevention of tooth decay. Mouthwashes strong enough to kill the harmful bacteria that accumulate between the teeth may also cause injury to the gums and mouth.

HEALTH AND FITNESS

The most important factors for maintaining good health are proper eating habits, regular exercise, weight control, and the avoidance of cigarettes.

EATING HABITS

The development of good eating habits does not require a sophisticated knowledge of nutrition. It is important to eat a well-balanced diet that provides adequate vitamins, minerals, proteins, fats, and carbohydrates. To maintain a well-balanced diet, you should select a variety of foods daily from the four basic food groups: the milk group includes milk, yogurt, cheese, and ice cream; the meat group includes beef, poultry, and fish (dried beans, dried peas, and nuts can serve as alternates); the vegetable and fruit group includes all fresh vegetables and fruits; and the grain group includes whole grain, and enriched products such as breads, cereals, pastas, and grits.

Good nutrition is best achieved by eating nutritious foods from these four basic food groups and by cutting down on sweets, salty treats, high-calorie drinks, and alcohol. Highly processed foods are generally less nutritious than natural fresh foods and should not constitute a large part of your diet.

Snack foods should be limited because they tend to be highly processed, lack nutritional value, and are high in fats, sugar, and salt—none of which promote good nutrition. The best snack foods are plain vegetables and fruits because they usually are high in vitamins and low in calories, fats, sugar, and salt.

Calories have little to do with nutrition. The calorie is a heat unit measurement. The body takes in calories during eating and drinking and burns off calories during daily activities of living. When more calorie units are taken in than are burned off,, the excess calories are stored as body fat. When too few calories are taken in, the body uses its own tissue, resulting in weight loss. Eating habits that minimize obesity tend to increase health and life expectancy.

In short, good nutrition lies in eating a variety of foods each day, avoiding highly processed foods and excessive use of sugar and salt, and eating in moderation. Good nutritious meals are available on all Navy mess decks and mess halls. These should be used instead of eating gedunk type foods.

PHYSICAL FITNESS

Physical fitness is as important to health as is good nutrition. Both support each other by creating a sense of well-being in a person.

The physically fit sailor generally has good health, stamina, endurance, and a sharp military appearance. People who are physically fit tend to have better mental health as well as good physical health. It has been confirmed by recent studies that people who exercise regularly actually do feel an increase in their sense of well-being. Long distance runners have long recognized this as the so-called "runner's high."

Exercise is the only way to become and remain physically fit. The form of exercise that you do should be determined by your likes and dislikes. Exercise that you strongly dislike doing will probably not be continued for very long. And that brings us to what is perhaps the most important thing to remember about exercise—it must be done on a regular basis. An on-again, off-again exercise program is more conducive to occasional sore muscles than to physical fitness.

SMOKING

The hazards of smoking tobacco are well-known. There is no longer any doubt concerning the dangers of smoking. Cigarette smoking has been identified as the most preventable cause of death in the United States, and the Surgeon General of the United States has identified it as the "first ranking public health problem in the United States today." It is a dangerous and ugly habit. If you do not smoke, do not start. If you do smoke, you should make every effort to stop. If you cannot quit, smoke less and switch to a lower tar and nicotine brand.

WEIGHT CONTROL

Excess body fat is a serious threat to health, longevity, stamina, and military appearance. All naval personnel are personally responsible for

maintaining themselves in a condition of physical fitness that will enable them to properly perform their duties and to present a sharp, trim, and military appearance. As you may know, excess weight and obesity are now given consideration in performance evaluations, promotions, and retention.

The wearing of the naval uniform should signify personal pride and satisfaction in looking sharp. Each of us is a representative of the United States Government and should present a physical configuration and posture that is trim and smart. Waistlines that stretch the front of an otherwise well-fitting blouse or shirt detract from a good military appearance.

Inactivity is the most important factor explaining the frequency of overweight in modern Western society. Since sedentary habits during the working day are an inevitable consequence of advancement in mechanized societies, including the military, weight gain becomes almost automatic for many of us. The consensus now among medical and health authorities is that the most effective way to take off weight and keep it off is through a program that combines proper exercise and reasonable diet.

If you need to lose weight, you should do so under the guidance of your physician or medical department representative. Without professional guidance, you should not try to lose more than 1 or 2 pounds per week, the objective being to reduce gradually and consistently. It is important to develop proper eating habits. A change in diet—perhaps a change as slight as taking less sugar or no sugar in beverages—may be all that is necessary to bring your weight down and keep it down, especially if coupled with a regular exercise program.

ALCOHOL

The vast majority of adult Americans have used alcohol in some form and at some time in their lives. And, as you may have observed, sailors are no exception. In fact, in the Navy, we seem to find more than the usual reasons for drinking that include promotions, reunions, transfers, port arrivals, and departures. In addition, many people drink because it is the weekend or because it is not the weekend

Moderate social use of alcohol is a widely practiced ritual and is generally acceptable. However, before you decide to drink or not to drink, there are a few facts that you should consider.

Alcohol is a drug. It has an effect on your body and brain (mind and thought process). The drug alcohol acts as a central nervous system depressant, which means it interferes with, or decreases, the activity of the brain. Moderate use will give you a warm glow, reduce anxiety, and relax and lower inhibitions. As the tongue loosens, conversation is facilitated. As the drinking continues, the conversation becomes loud and boisterous, and judgment and perception are impaired. Heavy alcohol consumption may result in loss of control, blackouts, and even death.

Alcohol is addictive. What starts out as social drinking may, and frequently does, result in alcoholism. Alcoholism is the third leading cause of death in the United States. Alcohol abuse is a major cause of highway accidents in the country. It is destructive to the individual, the family, the Navy, and the nation.

If you choose to drink, do so in moderation. If you can't control your drinking, get help. There is a counselor available to assist you through your command's Drug Alcohol Program.

DRUG ABUSE

Drug abuse is a serious problem in the Navy. It affects combat readiness, job performance, and the health of Navy personnel and their families, costing millions of dollars in lost time and productivity. But more specifically, it affects you.

Let us now look at some of the so-called frequently abused illegal drugs. As with alcohol, to use or not to use drugs is a decision that only you can make. The only way to make an intelligent decision is to be well-informed,. You are encouraged to do additional reading and research before you decide whether or not to use drugs. It is the position of this text that a decision to use drugs is DUMB. It is also illegal. One who uses illegal drugs must be willing to face the legal consequences of his or her actions.

The reasons people abuse drugs are as different as people are from one another. But people seem to take drugs most often to change the way they feel. They may want to feel better or to feel happy. They may want to escape from pain, stress, or frustration. They may want to forget or to remember, to be accepted, or to be sociable. Sometimes people take drugs to escape boredom, or to satisfy curiosity. At certain times peer pressure can be a very strong reason to use drugs.

People often feel better about themselves when they use drugs or alcohol, but the effects do not

last. Drugs never solve problems; they just postpone them. As a result, people who abuse drugs in the hope of solving one problem run the risk of getting trapped in a spiral of increasing drug use that creates new problems and makes old problems worse.

MARIJUANA

Marijuana ("pot," "grass," or "weed") is probably the most commonly used of the illegal drugs. An estimated 41 to 47 million Americans have tried marijuana at least once and approximately 16 to 20 million are considered current users. Marijuana may be smoked or eaten to produce a "high."

There is still not much known about the long range effects of marijuana use. There is evidence, however, that it can be harmful. Tests have shown that using marijuana impairs the ability to drive or to perform other complex tasks. It has not been proven that marijuana use causes physical dependence or that it necessarily leads to the use of other drugs. The real danger of marijuana use seems to be in the area of motivation and energy, both physical and mental. Some of marijuana's mental effects include impaired memory and altered sense of time, such as decreases in the performance of tasks involving reaction time.

Hashish, the dark brown resin from the tops of the cannabis sativa plant, has the same uses and effects as the dried marijuana leaves. It is more potent.

COCAINE

Cocaine ("coke") is usually seen in the form of a white powder. It is usually sniffed through the nostrils and its effects appear quickly.

Cocaine is not physically addictive, but its continued use can irritate the nostrils, throat, and sinuses. When taken in large doses over a long period, cocaine causes sleeplessness, anxiety, and sometimes delusions.

LSD

Probably the best known hallucinogen, or mind-changer, is lysergic acid diethylamide (LSD). LSD ("acid") is one of the most powerful chemicals known; an amount almost too small to be seen with the naked eye is enough to cause disorientation for up to 12 hours. Continued use of LSD can result in serious personality breakdown, although it does not create the feeling of dependence.

One of the most widely discussed effects of LSD is the flashback which is an experience resembling an original LSD reaction but is related to an earlier use of the drug. The flashback will most frequently occur among long-time users and may mimic either a "good trip" or a "bad trip." Although flashbacks occur only infrequently and not to all users, they have occurred for as long as 18 months following use of the drug.

The best way to deal with an individual who is having a "bad trip" (unpleasant LSD experience) is to talk with the person until he calms down. Assure him that what he is experiencing is temporary and is related to the drug. The individual may also need assistance to keep from hurting himself.

PCP

One serious drug of abuse, phencyclidine (PCP), is a tranquilizer for animals. Called PCP ("hog" or "angel dust"), its effects include a feeling of numbness in the arms and legs, and hallucinations. Sprinkled on tobacco or marijuana cigarettes, or taken in capsules, PCP can lead to feelings that everyone is against you. Its use has been linked with serious violence.

There is actually a great variability in the effect of PCP from one user to another. Some users may be violent and aggressive, while others may be silent, withdrawn, and difficult to communicate with. They may look drunk because they are so uncoordinated that they have trouble walking. Their speech is often confused and their vision may be distorted. Thinking, remembering, and making decisions can be very difficult.

Even though most users have reported primarily unpleasant experiences with PCP, it is still a widely used drug. As with LSD, the best therapy is to talk the user down from a bad experience.

HEROIN

Heroin ("junk," "smack," or "shit") accounts for 90 percent of the narcotic abuse in the United States. It is usually injected, creates a temporary "high," and is physically addictive when used regularly.

The life expectancy of a heroin addict who injects the drug directly into the blood stream is significantly lower than that of one who does not. An overdose can result in death. If, for example, an addict obtains pure heroin and is not tolerant of the dose, he or she may die within minutes after

injecting it. Infections from unsterile solutions, syringes, and needles can cause many diseases. Serum hepatitis is common.

In conclusion, many drugs are abused—legal as well as illegal drugs. Those covered above are only a few of the most common illegal drugs. It should be remembered, however, that all drugs can be harmful. The effect of any drug depends on many factors, including how much is taken and how often, the way it is taken (smoking or taking pills), whether other drugs are taken at the same time, the user's personality, and the setting. Many drugs are physically and psychologically addictive.

As the Navy provides help for the problem drinker, there is help at your command if you are a drug user or abuser. If you know of someone who is having trouble with drug use, you can help by referring that person to your command's Drug Alcohol Program Advisor or the medical department, chaplain, or other responsible person.

SLEEP

Because so many people worry about their sleeping or dreaming patterns, let us briefly examine this subject.

You have heard that the average adult needs 8 hours of sleep. Although that may often be the case, there is actually no medical proof that everybody needs 8 hours of sleep a night. Sleep patterns and needs vary greatly among individuals. Some people get along very well on 4 or 5 hours of sleep, others may need as much as 10 hours. Generally, you have had enough sleep if you awake feeling fully rested. And, despite what most of us think, an occasional sleepless night is not all that important. Even though you might feel awful and irritable, loss of sleep for 1 or 2 nights has little effect on normal performance and functioning.

You dream about 20 percent of an average night. During dreaming, part of the brain is awake and part is not. For example, the long-range memory part of the brain does not function during dreams. Therefore, in order to remember a dream, you have to wake up from it and think about the dream immediately after you awaken. Since dreaming is a light state of sleep one often wakes up from it. If someone reports he dreams a lot, it means one of two things: either he is not sleeping well and wakes up a lot; or he thinks about his dreams a lot just after awakening. Someone who says he or she never dreams is probably a reasonably sound sleeper, with few awakenings. This person probably jumps right out of bed when he wakes up and forgets his dreams. Someone who tells you he is dreaming more lately has either become more interested in himself and thinks more about his dreams, or the person is waking up more because he has developed poorer sleeping habits.

The best advice concerning sleeping and dreaming patterns is not to worry too much about either. Your body will regulate its need for sleeping and dreaming.

SEXUALLY TRANSMITTED DISEASES

Sexually transmitted diseases (STDs) are illnesses caused by organisms that are transmitted through sexual intercourse or by forms of other intimate body contact with an infected person. The disease germs that cause syphilis and gonorrhea are very fragile and can live for only short periods outside the body. STDs are not spread from inanimate objects such as toilet seats, drinking glasses, bed linens, or clothes.

Syphilis and gonorrhea are the two most common venereal diseases in the United States. Syphilis has had the worst reputation, but it is gonorrhea that is out of control.

SYPHILIS

Syphilis can attack any tissue or organ of the body and is especially damaging to the brain, spinal cord, blood vessels, and heart. Its incidence appears to be on the rise because it is often associated with other diseases that decrease the body's ability to fight infection.

A painless sore, called a chancre, is the first sign of syphilis. The sore usually appears on or around the sex organs about 9 to 90 days after contact with an infected person. The chancre will heal within a few weeks, even without treatment.

Other signs of syphilis that may develop either before or after the chancre goes away are a rash that may cover any part of the body; white, glistening spots in the mouth; and fever, sore throat, and headaches. The rash and other signs may not appear or may be so slight as to be unnoticed.

After these signs disappear, the germs may be hidden for 10 to 20 years. If untreated, the disease can cause mental illness, blindness, heart disease, or even death.

Syphilis is not inherited, but a pregnant woman with the disease can give it to her unborn child. These babies are born with congenital syphilis. A baby with congenital syphilis may be born dead or deformed. Congenital syphilis can be prevented if it is detected and treated in time.

The signs of syphilis may resemble many other diseases or the signs may be slight and be unnoticed. The disease can be detected by a blood test for syphilis.

GONORRHEA

If you have gonorrhea and do not get treatment, you may become sterile. Gonorrhea can damage the sperm ducts in males and the fallopian tubes in females. In men and women gonorrhea may result in crippling arthritis, meningitis, or heart disease.

The signs of gonorrhea in males usually appear 3 to 5 days after sexual contact with an infected partner. Most men have a pus discharge from the sex organ and a painful, burning sensation during urination. Women rarely have painful symptoms until gonorrhea has seriously damaged their reproductive system. There may be some vaginal discharge or burning during urination, but women will usually have no symptoms and will not know that they have gonorrhea until a sexual partner has been infected.

If you have syphilis or gonorrhea, a cure is as near as your medical department. But early treatment is important. These diseases can be cured even in people who have had the disease for a long time, but the damage to the vital organs may be irreversible.

Self-treatment or pills from a friend are extremely dangerous.

GENITAL HERPES INFECTION

This in an increasingly common viral infection that produces recurrent, painful genital sores similar to cold sores that occur around the mouth. There is no known cure for genital herpes at this time; the infected person may have recurrences of lesions throughout life. Individuals should avoid sexual intercourse when the sores are present because the herpes virus is infectious in this phase of the disease. Genital herpes is not infectious when the sores are not present.

PREVENTION

Using the condom, or rubber, during sexual contact offers some protection. Cleansing of the genital areas with soap and water immediately after sexual contact, as well as urinating right after sex, washes away some of the germs and may also help to prevent STDs. These steps do not ensure complete protection, but they will reduce the chance of infection. Birth control pills, of course, offer no protection against STDs. If you had the disease once and have been successfully treated, this does not grant you immunity from getting an STD again.

If you have been diagnosed as having a STD and are receiving treatment at the present time, do not attempt to hide the names of your sexual partners. The chances are that one of them infected you or that they were infected by you. They deserve the benefit of treatment, too.

ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS)

AIDS is caused by a virus that destroys the body's ability to combat disease and infection. Currently, the Navy conducts periodic testing of all its personnel to promote early identification and rapid education and intervention with those who carry the human immunodeficiency virus (HIV), the precursor to AIDS. Most people infected with HIV eventually develop AIDS, but how long that takes is not known. It is extremely important that **everyone** know about AIDS, how to prevent its spread, and how to reduce individual risk of contracting it. **AIDS leads to death; there is no cure!**

Although AIDS is discussed in this section, it is not purely a sexually transmitted disease, although sexual intercourse is the most common means of spreading the disease. Other ways it can be spread are through intravenous drug use, especially when dirty needles are shared; contaminated blood products are a source, but improved testing and control methods are minimizing the already low risk; and lastly, an unborn infant can be infected by its mother who carries the virus or has AIDS.

How can you reduce your risk for infection with HIV and AIDS? Abstaining from sexual intercourse, or choosing only partners who are not infected are the most effective ways. Be aware that a period of months or longer may pass before an individual who has been exposed to HIV actually tests positive as a carrier of the virus. Avoiding anal intercourse, oral-genital contact, and sexual partners with other sexually transmitted diseases are additional ways to reduce risk. Lastly, using condoms during sexual activity also serves to

reduce the risk of transmitting or contracting the virus.

AIDS is a deadly disease that is killing all its victims. The best known ways to control this disease is through educating the public and encouraging those at risk to change behaviors that are known to be associated with the transmission of the AIDS virus. It may take years for a cure to be identified; thousands, perhaps millions, will be infected and die during that time. A change in behavior can happen now.

BIRTH CONTROL

In sex, as in everything else, the basic obligation for people of any age is to determine what is responsible behavior. This certainly includes taking steps to avoid an unintended pregnancy. Before marriage whether to be sexually active or not is a decision that the persons involved must determine. And that means each person. It should also mean not placing the total responsibility for birth control on the other person.

There are a wide variety of effective birth control methods available. Oral contraceptives, intrauterine devices, and diaphragms are methods that require a physician's examination. Non-prescription forms of birth control that include spermicidal foams, creams, jellies, and condoms are often easier to use, and are inexpensive. How good they are depends on how correctly you use them.

Oral contraceptives (the pill) are the most popular female birth control method in the country. The pill must be prescribed by a physician to suit each woman's individual medical needs. No one should ever take another woman's birth control pills. The pill works by keeping the female hormone levels high enough to prevent the ovaries from releasing egg cells. No egg means no chance of pregnancy. To work effectively, pills must be taken regularly, day after day, according to the type prescribed.

The intrauterine device (IUD) is a small piece of flexible plastic, which comes in one of several shapes, that is inserted into the uterus by a physician and left there until a woman wants to become pregnant. Then it is removed by a physician. Its presence in the uterus interferes with fertilization and egg implantation, thereby preventing pregnancy. IUDs are not suited to all women and some, especially young women who have never been pregnant, may not be able to retain the device at all.

The diaphragm is a small, soft rubber cup that a woman places in her vagina just before sexual intercourse. The diaphragm covers the uterine opening (cervix). Before inserting, a woman must cover the cup with a spermicidal cream or jelly to make a sperm-proof barrier. Diaphragms must be fitted by a medical professional (women's internal sizes vary) who will also explain how to use it.

Spermicidal foams, creams, and jellies are inserted into the vagina with a special applicator just before sexual intercourse. They are harmless to everything except sperm. In order for spermicides to be effective, use enough at the right time (before there is any contact between the penis and the vagina).

If a woman uses foams, creams, and jellies, she will be even safer if she asks her partner to wear a condom. Condoms are balloon-like sheaths made of thin latex or animal tissue, which are rolled onto the man's erect penis before there is any contact with the vagina. This is important because the drops of semen released when a man has an erection also contain sperm that can make a woman just as pregnant as those sperm released at climax. About a half inch of room should be left at the tip of the condom to catch the semen. As mentioned above, condoms also give some protection against STDs. After a man climaxes, he should be careful to keep the condom from slipping off as he withdraws. Condoms should be thrown away after use.

RAPE

Rape is a major crime under both civilian law and the Uniform Code of Military Justice (UCMJ). Few crimes in our society are more devastating—physically and emotionally—than sexual assault. Rape is a violent crime characterized by the use of force or threat against the victim's will. No longer is rape limited to a single action perpetrated by one sex. It is seen as any form of sexual imposition committed by one individual upon another. Any person can be the victim of rape. If you should become a victim of rape, get help. Many rape victims are afraid or ashamed to talk to anyone. Do not be! Remember that it is the rapist who committed the crime, not you.

The most important thing after an attack is to contact security or the police and to report to the hospital or sick bay. Remember, do not change your clothes, wash or douche until you

have been medically examined. Changing clothes and bathing may destroy valuable evidence that might be used to arrest and convict your attacker.

Every 7 minutes, another rape occurs in this country. The number of reported rapes has increased 35 percent in the past 5 years. In the past, nearly all news media and public information campaigns have aimed their messages at women, telling them what to do to lessen their chances of being raped. But rape is not just a woman's problem, it is a man's problem, too.

There is one other thing to be kept in mind. No matter what preceded the incident, the rape victim's sexual history is generally not admissible as evidence in a rape case under the UCMJ.

Statutory rape is not counted in the forcible rape totals, but if a young sailor picks up a girl even younger, he should remember this. If she is under age and he has sex relations with her, he can be charged with statutory rape, even if she agreed to it.

The maximum penalty for rape under the UCMJ is death. Just in case you are interested.

APPENDIX I

GLOSSARY

This glossary has been developed to assist the non-medic in interpreting the meaning of common medical terms. To be of immediate assistance to the non-medic, the definitions have been made as brief and simple as possible. If more detailed definitions are required, a standard medical dictionary should be consulted.

ABDOMEN—the belly. The area of the body that lies between the chest and pelvis.

ABSCESS—a swollen, inflamed area of body tissue in which pus collects.

ABSORBENT—having ability to soak up or take in another substance.

ACUTE—sharp and severe. A condition of rapid onset and short duration, as in pain or illness.

AIDS—A virus that destroys the body's ability to combat disease and infection.

AIR PASSAGE—any of several tubes which transmit air from the nose or mouth to the lungs.

AIRTIGHT—preventing the passage of air.

AIRWAY—the route for passage of air and/or gases into and out of the lungs.

ANAPHYLACTIC SHOCK—a severe allergic reaction of the body to a foreign substance.

ANTIDOTE—a remedy or agent that neutralizes a poison.

ANTISEPTIC—an agent which prevents or slows down growth of disease-producing organisms. Free from contamination.

ANTITOXIN—a substance that works against a poison.

ANTIVENIN—an antitoxin against animal or insect venom.

APPENDAGE—a body part branching off from the trunk; for example, an arm or leg.

ARTERIAL PRESSURE—the pressure of the blood in the arteries.

ARTERY—a tube-like body structure which carries blood and oxygen from the heart.

ARTIFICIAL VENTILATION—movement of air into and out of the lungs by artificial means.

ASEPTIC—free from germs.

ASPHYXIATE—suffocate, smother.

ASPIRATION—to draw in or out. To suck in.

BLISTER—a small rounded elevation of skin, usually filled with fluid.

BLOOD POISONING—the presence of bacterial and toxic materials in the blood. Also referred to as septicemia.

BOIL—a red and swollen sore on the skin.

BUTTOCKS—two rounded, muscular areas at the back of the hips; the rump.

CAPILLARY—tiny tube-like vessels that connect veins and arteries.

CARBON MONOXIDE—a poisonous gas without color, taste, or odor.

CARBUNCLE—a red and swollen sore filled with pus, located on the skin surface, and extending into deep body tissue.

CARTILAGE—a tough, elastic, connective tissue in the joint ends of bones, and the nose and ears.

CAUTERIZE—to burn or sear injured tissue.

CENTRAL NERVOUS SYSTEM (CNS)—the brain and spinal cord.

CHRONIC—long and drawn out.

CLAMMY—damp and cool.

CLAVICLE—the collarbone. Forms the front part of the shoulder; attaches to the top of the sternum (breastbone) and scapula (shoulder blade).

CLOT—a semisolid lump or mass formed by thickened blood.

COMA—a deep state of unconsciousness usually caused by disease, injury, or poison.

COMPRESS—a cloth wet or dry, applied to an injury, to control bleeding, or swelling.

COMPRESSION—to press together into a smaller space.

CONCUSSION—a jarring brain injury resulting from a head blow or fall.

CONSCIOUS—awake, aware, and responsive to stimuli or surroundings.

CONSTRICT—to make narrow, as when the pupil of the eye reacts to light.

CONTAGIOUS—catching. Transmitted from one person to another, either directly or indirectly.

CONTAMINATE—to introduce an impure substance into a clean or aseptic area; for example, dirt entering a wound. To infect.

CONTRACTION—shortening or tightening.

CONTRAINDICATION—a special condition which causes a normal treatment procedure to be improper or undesirable.

CONVULSION—an abnormal, violent, and involuntary contraction of the muscles. A fit or seizure that can be caused by poison, drugs, drug withdrawal, or epilepsy.

CYANOSIS—bluish discoloration of the skin from lack of oxygen in the blood.

DECOMPOSITION—decay.

DECONTAMINATE—to rid the body, clothes, room, linen, containers, etc. of anything that is dangerous or poisonous.

DEFORMITY—a bodily deviation from normal shape or size, resulting in distorted appearance.

DELIRIUM—a temporary mental disturbance characterized by confusion, excitement, disordered speech, and hallucinations.

DIAGNOSIS—recognition of a specific disease.

DIARRHEA—frequent passage of stools that have more or less liquid consistency.

DILATE—to make wider or to expand, as when the pupil of the eye adjusts to darkness.

DILUTE—to make thinner by mixing with water or other liquids.

DIRECT PRESSURE—force applied directly on top of a wound to stop bleeding.

DISINFECTANT—a chemical that kills or stops the growth of bacteria and germs.

DISLOCATION—displacement of a bone in a joint so that joint surfaces do not make proper contact.

DISTENTION—stretched out. Inflated.

DRESSING—sterile gauze or bandage applied to a wound and fixed in position.

DYSPNEA—difficult or labored breathing.

EDEMA—a collection of fluid in the body tissues which causes swelling.

ELIMINATION—getting rid of the body's waste products.

EMBEDDED—surrounded closely.

ESOPHAGUS—the tube that carries food from the mouth and throat to the stomach.

EVAPORATE—to change from liquid to a gas or vapor.

EXHALATION—breathing out.

EXTENSION—a movement which straightens a limb.

EXTERNAL—pertaining to the outside.

EXTREMITY—an arm or leg. A body part branching off from the trunk.

FEMUR—the thighbone. The bone that extends from the pelvis to the knees—the longest and largest bone in the body.

FEVER—an elevation of body temperature above normal (98.6°F) or (37°C).

FLEXION—the vending motion of a joint.

FLUSH—sudden redness of the skin; or to wash by pouring large amounts of water over an area.

FORCEPS—a ton-like instrument for holding or grasping skin, dressings, or instruments. Also used as tweezers for removing splinters and barbs.

FOREIGN OBJECT—not normally a part of the body.

FRACTURE—any break or crack in a bone.

FROTHY—bubbly or foamy.

GANGRENE—death of tissue generally associated with loss of blood supply, injury, or disease.

GASTRIC DISTENTION—enlargement of the stomach caused by trapped air.

GROIN—the region where the abdomen and thighs join.

HAIR FOLLICLE—the root of the hair.

HALLUCINATIONS—seeing, smelling, or hearing things that are not real or true.

HEMORRHAGE—internal or external bleeding.

HEMOTOXIC—poisonous to the blood.

HYPEREXTENSION—extension of an arm or leg beyond normal limits.

IMMOBILIZE—to make incapable of moving, as with a splint or cast.

IMPAIRMENT—sickness or injury.

IMPERMEABLE—not allowing passage of fluids.

IMPREGNATE—to soak, fill, or saturate.

IMPROVISE—to make from available materials, usually on the spur of the moment.

INCISION—a cut made by a sharp instrument.

INCOHERENT—not understandable.

INFECTION—invasion and multiplication of germs in the body, resulting in tissue damage.

INFLAMMATION—swallowing substances taken into the mouth.

INHALATION—breathing in.

INTERNAL—pertaining to the inside.

IRRIGATION—cleansing by washing and rinsing with water or other fluids.

LARYNX—voice box.

LISTLESS—having no desire to exert oneself.

LITTER—a stretcher for carrying sick or injured.

MICROORGANISMS—bacteria or germs that are so small that they can be seen only through a microscope.

MUCOUS—a thick, sticky fluid secreted by mucous membranes and glands.

NAUSEA—a sickness in the stomach which produces a feeling of a need to vomit.

NEUROTOXIC—poisonous to nerve cells.

NEUTRALIZE—to make harmless. To destroy effectiveness.

OINTMENT—a soft, oily substance having antiseptic and healing properties.

ORGANISM—any individual living thing.

PARALYSIS—temporary or permanent loss of feeling or ability to move.

PERFORATION—a hole or series of holes made through a substance.

PERITONITIS—inflammation of the internal membranes lining the abdominal cavity.

PHARYNX—throat.

PNEUMONIA—an inflammation of the lungs caused by viruses, germs, or physical and chemical agents.

POROUS—containing or being full of tiny holes.

POTABLE—water or liquid suitable for drinking.

POTENCY—power, strength.

PRESSURE POINT—areas of the body where arterial blood flow can be stopped by pressing an artery against a bone.

PROFUSE—in large amounts.

PRONE—lying face downward.

PROSTRATION—complete exhaustion.

PULSE—the throbbing of arteries caused by the beating of the heart.

PUNGENT—sharp and harsh in taste or odor, irritating.

PUPIL—the opening in the center of the eye through which light passes—necessary for vision.

RELAPSE—slipping back or getting worse.

RESPIRATORY OBSTRUCTION—a blockage in the breathing system that prevents it from functioning normally.

SCALP—the skin of th head, excluding the face and ears.

SEIZURE—an attack, (fit), such as convulsions, in which there is some loss of body control.

SEMICONSCIOUS—not fully awake or oriented to surroundings.

SHOCK—a generalized depression of all body functions which results in decreased blood flow.

SIGNS—indications of a victim's condition visible to the rescuer.

SKULL—the bony framework of the head.

SPASM—sudden, involuntary movement of a muscle or muscles which is usually associated with pain.

SPINAL CORD—the cord of nerve tissues extending from the brain down the length of the spine.

SPINE—the backbone.

SPINEBOARD—a device used primarily for transporting patients with suspected or actual spinal injuries.

SPLINT—any material used to immobilize, support, or protect an injured area.

STERILIZE—to destroy germs. To make free from bacteria.

STOOL—waste matter discharged from the large intestine.

STRETCHER—a litter on which a patient can be carried.

STUPOR—state of being less responsive or sensible.

SUBCUTANEOUS—just beneath the skin.

SUCTION—the act of drawing up or out.

SUPERFICIAL—at, on, or near the surface.

SUPINE—lying on the back with the face upward.

SWATHE BANDAGE—a bandage that passes around the chest, used to hold an injured arm to the chest or immobilizing fractured ribs.

SYMPTOMS—indications of a victim's condition as stated by the victim.

TETANUS—a bacteria which can enter the body through dirty wounds. It causes muscle spasms, and rigid neck and jaw muscles (lockjaw), often resulting in death.

THORACIC—pertaining to the chest.

TISSUE—living cells formed into a body structure such as the muscles.

TOLERANCE—power to resist.

TOURNIQUET—a device that is twisted around an extremity to stop severe bleeding. Usually consists of a band of flat material. Used only when all other measures fail.

TOXIC—poisonous.

TOXIN—a poison.

TRACHEA—the windpipe.

TRACTION—the act of pulling or drawing something straight.

TRAUMA—a wound or injury that is violently produced.

TRIANGULAR BANDAGE—a piece of cloth cut in the shape of a right triangle, used as sling for the arm and other bandaging purposes.

ULCER—an open sore on the skin or mucous membrane which drains tissue fluid.

UNCONSCIOUS—unable to respond to stimulation—"out cold."

VACCINE—a prepared mixture of living or dead germs which assist the body in developing resistance to certain diseases.

VASCULAR—relating to blood vessels.

VEIN—a tube-like body structure which returns blood to the heart.

VENTILATION—the process of breathing in and out to supply the body with oxygen and remove carbon dioxide.

VIRUS—an organism that can cause infectious or communicable diseases.

VITAL SIGNS—measurable signs by which the physical state of an individual can be determined—usually includes the pulse, respiratory rate, blood pressure, and the level of consciousness.

WINDPIPE—the tube through which air passes from the throat to the lungs.

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